

ANATOMY

KEILL

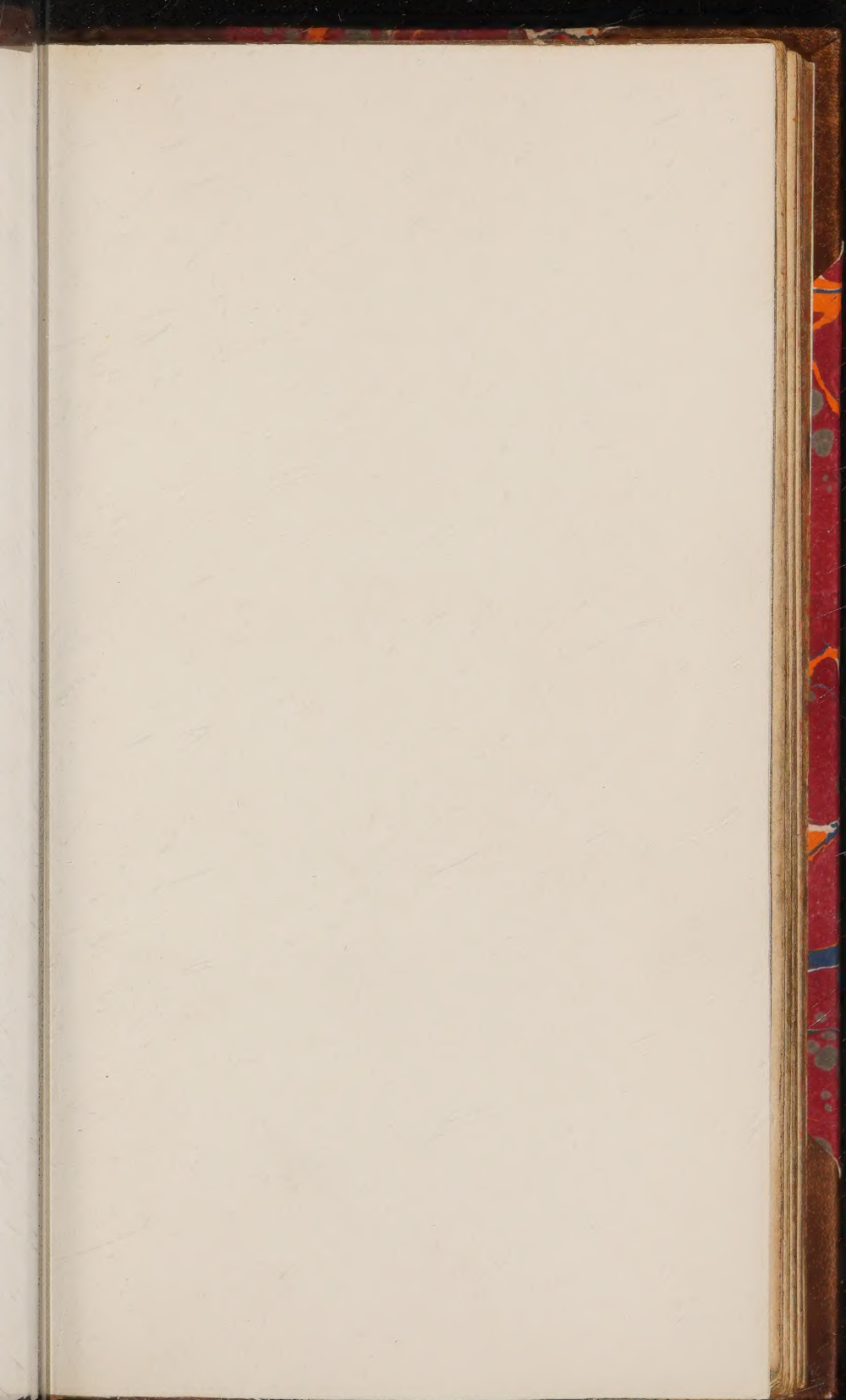
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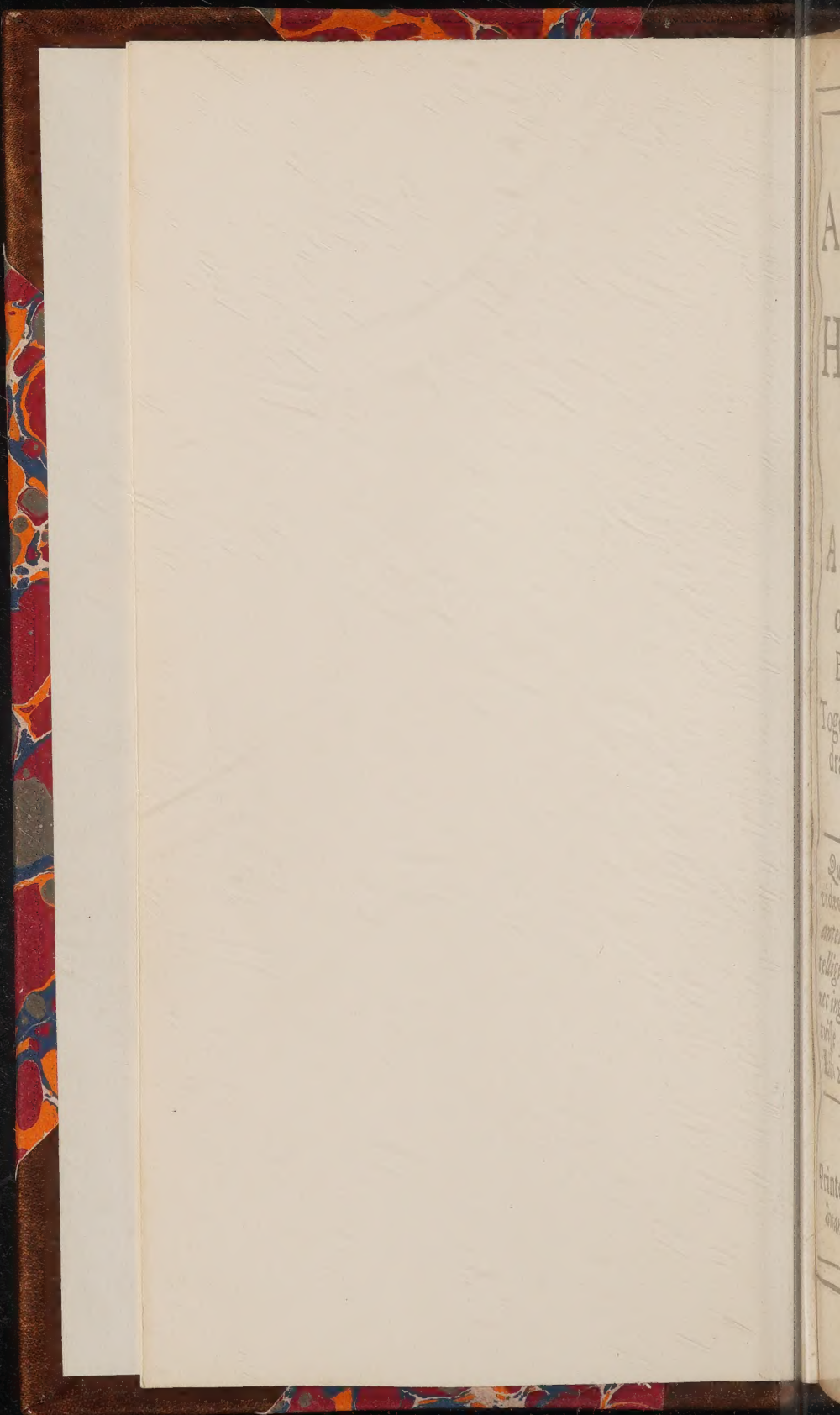






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THE
ANATOMY
OF THE
Humane Body
ABRIDGED ;

OR,
A Short and Full View
of all the PARTS of the
BODY.

Together with their several Uses
drawn from their Compositions
and Structures.

*Quibus autem expositis, satis docuisse
videor, Hominis natura, quanto omneis
anteiret Animanteis, ex quo debet in-
telligi ; nec figuram, situmq; Membrorum,
nec ingenii mentisque vim talem effici po-
tuisse fortuna. Cicero de Nat. Deor.
Lib. 2.*

LONDON, .o

Printed for William Keblewhite, at the
Swan in St. Paul's Church-Yard, 1698.

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OF THE
HUMAN BODY
ABRIDGED;

OR,
A Short and Full View
of all the Parts of the
BODY
together with their several Uses
drawn from their Compositions
and Structures.

Revised edition, corrected, and
enlarged. By W. Keble, M.D.
F.R.S. &c. &c. &c. &c. &c. &c.
LONDON:
Printed for W. Keble, at the
Sign in St. Paul's Church-Yard, 1688.

TO THE

Very Worthy and Ingenious

Dr. EDWARD TYSON,

Fellow of the COLLEGE of
PHYSICIANS, and of the ROYAL-
SOCIETY, Physician to *Bethlem-*
HOSPITAL, and Lecturer of
ANATOMY at the *Chirurgeons-*
Hall in LONDON.

SIR,

I Would scarce have ad-
ventured the Publishing
of the following Sheets, if
after a particular and care-

A 2 ful

The Epistle

ful Perusal you had not
been pleased to Advise and
Encourage me to it ; and
I desire the Favour of pre-
fixing your Name to them
that the World may know
your Approbation, which
will sufficiently secure me
from Censure, and recom-
mend them as containing
something Exact and Use-
ful : for your Skill and
Judgment in this Subject
is well known, and abun-
dantly demonstrated by
those Treatises with which
your

DEDICATORY.

you have obliged the World,
and the Publick Lectures,
by which you have adorned
the Honourable and Useful
Office you have held for se-
veral Years. But yet I am
not so Vain as to think there
are no Slips nor Errours in
this little Treatise, nor will
I impose so far upon your
Goodness and Civility as to
expect your Patronage of
them. I only hope, that
after your Example, others
will be so Candid and Civil
as to pass them over.

A 3

I do

The Epistle, &c.

I do also readily accept
of this Occasion, to pay my
most hearty Acknowledg-
ments for your private Fa-
vours and Civilities. And
as I have a true Esteem
for your Merits, so I shall
be always ready to shew
my self,

Your most humble

and most Obliged

Servant,

JAMES KEILL.

PREFACE.

ANatomy, or the Knowledge of the Structure of Beasts is as old as Sacrifices, which have been in use at least ever since the Fall; and that of the Humane Body began with the Custom of Embalming the Dead, which is also very Ancient.

But this Science has not had an Advancement proportionable to its Early beginning; for we find it but very Imperfect under the *Grecian* Empire, where nevertheless it was more particularly studied than for some time afterwards by the *Romans*, who, out of their too great Superstition, would not allow any,

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besides their Priests to have the Inspection of Bodies.

In the Days of Ignorance, when all Knowledge seemed to be Buried, this Science was also Neglected: But when the Rest were Revived, this was also Cultivated. It has advanced daily ever since the middle of the last Century: And the present Age has not only rectified the many Mistakes of the Ancients, discovered several things which they might have plainly seen, but also by their Glasses have far out-done the Scrutiny of the naked Eye, laying open such things that the former Ages could never have known, because they had no such Helps.

And, indeed, the Advantages of Anatomy are so many, and so great, that there is all reason to ply and promote the
Know-

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Knowledge of it. It has been always reckoned useful to Physick, because Physick cannot be rightly Administred without a due Knowledge of the Structure and Oeconomy of the Body; tho' it must be confessed, that the Practice of Physick is neither much altered nor improved by the late curious Discoveries of Anatomy; yet they are no small Help both to Physicians and Surgeons; for he, who knows his Subject best, can certainly Practise with greater Assurance, than he who knows little or nothing of it. He is not afraid of every thing which appears frightful, neither does he slight things which seem to be of less moment, which he knows may sometimes foretell the greatest Danger, whereas it is impossible that an Ignorant Per-

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son can distinguish this, because he can judge of things only by their outward Appearances. But abstracting from Physick, Anatomy is very Useful, and therefore to be cultivated as a Special Part of Natural History, which affords as much Pleasure, Satisfaction, and Profit, as any other Part whatsoever. The Structure and Contrivance of the Body, is not only Admirable in it self, and therefore very worthy to be considered; but also of great Use for suggesting profitable Inventions, and for perfecting Humane Art, by shewing how it may best imitate Nature. Thus Microscopes and Optick-Glasses were made in imitation of the Eye, and the various Kinds of joining were taken from the different Ways the Bones are joined together. Thus
the

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the Observation of the Valves of the Heart and Veins taught us to use the same Device in the Air Pump and Wind Gun; and Chymists have learned their Dissolutions, Digestions, Secretions, and other Alterations from what they find performed in the Body: And without doubt, after-Ages, upon further Discoveries and Observations of the Structure and Oeconomy of Bodies, may be directed to several Useful Contrivances for the Advantage of Life.

I have not adventured to Publish the following Treatise from any Disesteem of what is already published by others; but as there are not so many Treatises of this Nature, especially in English, as to render New ones altogether Useless; so I may, without Vanity,

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nity, say, that this which we here offer to the Publick, is as full, and at least as exact as any, according to the latest Discoveries, tho' it is much more brief than others, which are enlarged for the most part with Dissertations, which are either Frivolous and Useless, or very tediously handled; both which tire the Reader's Patience, and also interrupt the Series of the Description, which is chiefly to be observed.

My Design was to give a small Pocket-Book, in which, one, upon any Occasion, without much Reading, might have a full View of the Structure of any Part. And for this cause, I have followed the Method of that useful Epitome, written by Monsieur *Bourdon*, who has expressed some things, especially in his first Chapter, so briefly,

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briefly, and yet altogether so fully, as that I thought I could not do better than to Copy after them. Through all I have Carefully observed to give an Entire and Uninterrupted Description of such Parts as have a dependence upon one another, that by passing from one thing to another, in a Natural order, I might avoid the Confusion, which such a multiplicity of things would occasion otherwise. The Osteology and Myology (I think) are very Plain and Exact for the Use of Surgeons, and in all there are several things which have scarcely been observed before. In this small Treatise there are no Cuts, because I am of the Opinion, that unless Cuts be extraordinarily well done, they do more harm than good : and to have
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contrived fine Cuts for so small a Volume, would have been both very Difficult and Expensive. This is sufficient to them who have seen Dissections: And such as are curious for Cuts may have, in a little time, the best that have been ever done yet; for which the Publick will be exceedingly indebted to the Care of the Worthy and Exact Mr. Cooper.

I will not answer for all that I have said upon the use of the Parts; it was sufficient for a Compend to have delivered the common Opinions, or those that seemed to me most probable, which I have drawn for the most part from the Structure of the Parts themselves, so as that the Reasons for them do easily appear. I have spoken with a greater
assu-

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assurance of those things of which we have a clearer Knowledge, whilst other things are only put off with a *Perhaps*, or a *May be* : And in some things I have been content to shew only the Weakness of the common Opinions.

The Knowledge of the Animal Oeconomy, and of the Use of the several Parts of the Body is very desirable, but it is to be obtained only by Observation and Experience; the Progress, which is made by following this Method, may indeed be somewhat slow, but it is sure and solid, and will give greater Satisfaction to the Lovers of Truth, than all the subtile Systems, which are indeed but so many Philosophical Romances; because they are not built upon Matters of Fact, but upon Precarious and
Ima-

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Imaginary Hypotheses. *Cartesius* introduced, or at least revived this sort of Philosophy, which has been very Prejudicial to true Philosophy, and has very much hindred the Advancement of the Knowledge of other Parts of Nature as well as of this of which we now treat. An ingenious Romance, or well-contrived Play, may give some pleasant Diversion; but every Wise Man will prefer a true History to the best of them. Even so the Knowledge which comes by true Observation and Experience, is preferable by far to the Systems of the most Ingenious Virtuoso, who has not been at the pains to trace Nature, but only consulted his own Fancy. Truth is to be searched after and not Specious Appearances: Nor can we
ever

PREFACE.

ever know the Truth, but by considering attentively what *de facto* is; for many things appear Rational, which are not True. How long might we have reasoned about the Use of the *Tubæ Fallopiæ*, and have been never a whit the Wiser, if Observations and Experiments had not taught us their true Use? Who could ever have imagined, that a Tube, which lay loose in the Cavity of the *Abdomen*, should, in the time of Conception, move towards the *Ovarium*, and embrace it for the reception of the Egg? If the Dissection of Animals, after their Conception, had not demonstrated the Truth of this to us, some fancied other Uses of them, and others would have studied to render this ridiculous, as if these Tubes were
thereby

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thereby made intelligent Beings, capable to know the time of Conception, and the place where the *Ovaria* lie. When Men reason either in Anatomy or other things without making Observation and Experience their Guide, they often take Truths for Falsehoods, and Falsehoods for Truths, which is of very bad Consequence when they come to practise upon these Suppositions. And hence it is that those Physicians and Surgeons are the worst Practitioners, and the least successful who are too much addicted to some Philosophical and uncertain Systems, and who proceed upon the Truth of them.

How many fine Discourses have we upon the use of the Parts of the Brain, upon Digestion, upon the use of the Spleen,

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Spleen, upon Generation and Secretion of the Humours, and upon the Motion of the Muscles? How much wiser are we for them all? Who dare be Positive in determining the Uses of these Parts, or that they perform their Functions such a way, and no other ways? I wish Men would give their true Observations and Experiments, without the addition of their Conjectures and Reasonings, which for the most Part do amuse and perplex the Reader. If Observations were nakedly delivered, I doubt not but we should come sooner to a greater and clearer Knowledge of Nature, and particularly of Anatomy. I do not Promise, that the Whole of Nature may be found out, or that the whole Animal Oeconomy may be discovered; for
there

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there are some Parts whose Nature and Situation put it out of our Power to make so many Experiments as are sufficient to lay open their true Uses and Functions: And therefore a perfect and complete Knowledge of the Oeconomy of the Body is hardly to be hoped, because our Reason alone is not sufficient to procure it: and where Observation fails, we reason but in the Dark, and are very liable to Mistakes. There can be no true Science without certain Axioms and Principles; and those proper for Anatomy must only be true Observations and undoubted Experiments; What is evidently drawn from them ought to be received as certain Truths, but what is delivered without Observation and Experience, or raised from doubtful Observations

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tions is uncertain Conjecture, and little to be regarded. As a Blind Man can never reason rightly about Light, nor make any Progress in the Knowledge of it; because he hath neither any true Notion of Light, nor can he be sensible of the Effects of it; even so we can never discover the Use of those Parts of the Body, whose Entire Composition and Texture are without the reach of our Sight and Observation. And after all, tho' we knew the whole Composition of the Body, and the several Parts; yet it would require the very height of Reason and Geometry to Understand and Comprehend perfectly the Contrivance of it; which made the Psalmist say, *I am fearfully and wonderfully made.* And which shews, that Anatomy is a Noble and
Curious

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Curious Study, proper for the
most Ingenious Spirits, and eve-
ry way most worthy of their
Pains and Contemplation.

E R R A-

100
101
102

103

E R R A T A.

PAge 17. line 14. read *Lympha*, p. 22. l. 25.
r. *its*, p. 29. l. 24. r. *lie*, p. 94. l. 3. for
Shapes r. *Parts*, p. 128. l. 7. for *contrasts* r.
d. lates, p. 176. l. 25. r. *slippery*, *ibid.* l. 28.
r. *Oesophagæus*, p. 181. l. 3. r. *joined to the An-*
gles of the Thyroides, p. 197. l. 28. for
is opened, r. *opens*, p. 227. l. 16. r. *is received*
into.

(I)

THE
ANATOMY
OF THE
Humane Body
ABRIDGED.

CHAP. I.

*Of the Component, External, and
Common Parts of the Body.*

SECTION I.

Of the Component Parts.

I Purposely pass over the various Definitions of a Part, as being of no great Use; and for the same Reason I will not trouble the Reader with the several Divisions which Anatomists make of the Parts of the Humane Body. It is sufficient to know that all the Parts are made up of Threads or Fibres, of which there be different Kinds;

*All the Parts
are made up
of Fibres.*

B for

Of the External Parts.

for there are some soft and flexible, and these are either hollow like small Pipes, or spongy and full of little cells, as the nervous and fleshy Fibres; others there are more Solid, flexible, but with a natural Elasticity or Spring, as the Membranous and Cartilaginous Fibres: And a Third sort are hard and inflexible as the Fibres of the Bones. And of all these, some are very sensible, and others are destitute of all sense; some so very small as not to be easily perceived, and others on the contrary so big as to be plainly seen.

Now the several Parts of the Body are formed by the various texture and different Combination of some or more of these Fibres; and therefore tho' commonly the Bones, Nerves, Ligaments, Cartilages, Veins and Arteries are reckoned Similar Parts, that is Parts made up of one sort of Fibres, yet all of them have either more or less of different sorts of Fibres, and may be called Dissimilar Parts, as well as the Lungs or Stomach.

*No Similar
Parts.*

S E C T. II.

Of the External Parts.

*The Division
of the Body.*

THE Body is divided into four Principal Parts; which are, the Head, the Thorax, the Abdomen and the Extremities, viz. the Arms and Legs.

The

Of the External Parts.

3

The External Parts of the Head or upper Cavity are, the Face, and the *Calva* or Hairy Scalp. The Parts of the Face are, the Brow, the Ears, the Eyes, the Cheeks, the Nose, the *Philtrum* and its sides, the Mustaches, the Lips, the Mouth, and the Chin. The Parts of the Hairy Scalp are, the *Sinciput* or Forehead, under which lieth the *Os frontis*; it reaches to the *Coronal Suture*. The *Occiput* or Hind-head, under which lies the *Os Occipitis*, it reaches from the angle of the *Sutura Lambdoïdalis* to the first *Vertebra* of the Neck. The *Vertex* or Crown of the Head, under which is the *Sutura Sagittalis*, and part of the two Parietal Bones. The Temples or the sides of the hairy Scalp, under which are the *Crotaphite Muscles*, the *Ossa Petrosa*; they reach to the *Sutura Squamosa*.

The external
Parts of the
Head.

The External Ear is divided into two Parts, of which the upper is called *Pinna*, or the Wing; the lower *Fibra* or Lobe. The Parts of the *Pinna* are the *Helix*, which is the outward circle or border of the Ear; the *Anti-helix* which is the Semicircle within the other, and almost parallel to it: The lower end of this Semicircle makes a little Prominence, which is called *Antitragus*; there is another Prominence just opposite to it, which is called *Tragus*, because of some Hair that is upon it. The Cavity made

Of the Ear.

Of the External Parts.

by the *Anti-helix* is called *Concha*; the hole in the middle of the Ear, which goes to the *Tympanum*, is called *Alvearium*.

Of the Eyes.

The External Parts of the Eyes are, the *Supercilia* or Eye-brows, the *Canthus Internus* or the great Angle, where the *Caruncula Lachrymalis* is, the *Canthus Externus* or the little Angle, which is the furthest from the Nose, the *Palpebra* or the upper and lower Eye-lids, which cover the Eyes; the *Cilia*, which are little Cartilages on the edge of the Eye-lids; the *Puncta Lachrymalia*, which are two little holes near the big Angle of the Eye; there are Hairs upon the *Cilia* in form of a Pallisado. The *Orbite* is a Cavity made by the Bones, in which the Globe of the Eye is contained, with its six Muscles; the *Tunica Conjunctiva*, which is the white of the Eye; the *Cornea*, the *Iris*, in the middle of which is *Pupilla* or Pupil, or Sight.

Of the Nose,
Lips, &c.

The Nose has its *Spina* or ridge. It reaches from the Brow to the Cartilage *Acromion*. The *Acromion* reaches from the end of the Spine to the *Globulus* or tip of the Nose. The Nostrils are the Passages into the Nose. The *Ale* or wings of the Nose are the sides of the Nostrils. The *Columna* is the little fleshy Portion, which reaches from the tip of the Nose to the *Philtrum*; it divides

vides the Noftrils. The *Philtrum* is the little Canal, which comes from the lower part of the Nofe upon the upper Lip. The Cheeks reach from the lower part of the Eyes to the Lips. The *Mentum* or Chin, is the fore part of the Lower-Jaw. The Lower-Jaw reaches from the two Ears to the Chin inclusively. The Lips are the Musculous Flefh at the entry of the Mouth; their External Part is called *Prolabium*, and that, which is tinctured red, *Proftomia*. The Gums are the Flefh which cover the lower part of the Teeth.

The Neck reaches from the Head to *Of the Neck* the *Clavicula* or Chanel Bones. Its Parts are the Throat, which is its forepart, along which defcends the *Trachea Arteria* or Wind-pipe, and the *Oefophagus* or Gullet. The *Pomum Adami* is the eminence which appears in the upper Part of the Throat. The *Cervix* is the hind-part of the Neck; its upper part is called *Lophia*, the middle *Foffa*, and the lower *Epomis*. The *Parotides* make the upper and lateral Part of the Neck, *Terthra* the middle, and *Paralophia* the lower. The *Clavicula* or Chanel-bones, are the two little Bones fituated at the Basis of the Neck above the Breaft.

All that lies betwixt the *Clavicula* or *Of the External Parts of the Thorax or middle Cavity.* Chanel Bones, and the *Diaphragma* or Midriff is taken for the *Thorax*, that is

Of the External Parts.

to say, from the Basis of the Neck to the last of the false Ribs inclusively. The forepart of the *Thorax* is called the Breast; it is composed of the *Clavicule* and the *Sternum* or Breast Bone which is in the middle; it begins at the *Clavicule* and terminates in the *Cartilago Xiphoides* or Sword like Cartilage. Under the *Sternum* lies the *Mediaſtinum*, and the Heart in its *Pericardium*. The *Mammæ* or Dugs are two round Tumours, which appear upon the forepart of the Chest, under which are situated part of the Ribs, the *Pleura* and the Lungs: There stands upon their Centre a little Protuberance called *Papilla*, or Nipple, which is encompassed with a reddish circle called *Areola*. The hinder Part of the *Thorax* is called the Back, composed of 12 *Vertebrae* or Joints, and two *Scapulae* or Shoulder Blades, which are the two upper Parts of the Back on the sides of the *Vertebrae*. The lateral Parts of the *Thorax* are called *Peristerna*.

Of the External Parts of the Abdomen, or lower Belly.

The Lower Belly extendeth from the *Cartilago Xiphoides*, to the *Os Pubis*; the forepart is called *Abdomen*, and the hindpart the Backside. The *Abdomen* is divided into upper, middle, and lower Parts. The upper reaches from the *Cartilago Xiphoides* till within two Fingers breadth above the Navel; it is called *Epigastrium*, and its two sides *Hypochondria*:

dria : it covers a Part of the Liver and Stomach ; the right covers the greatest Part of the Liver : the left the Spleen, part of the Stomach, and *Colon*. The middle Part of the *Abdomen*, is only two Fingers breadth above, and as much below the Navel ; it is called *Regio Umbilicalis* ; its middle is called *Umbilicus* or Navel, thorow which passes the Umbilical Vein, two Arteries, and the *Urachus*. Under the middle of this Region lies all the *Intestinum Jejunum*, and Part of the *Ileum*. The sides of this Region are called by *Glisson*, *Epicolica*, because they cover the *Colon* : Under the right is contained the right Kidney, part of the *Colon*, and *Jejunum* : under the left is contained the left Kidney, with part of the *Colon* and *Jejunum*. The lower Part of the *Abdomen* reaches from the Umbilical Region to the lower Part of the *Os Pubis* ; it is called the *Hypogastrium* ; it covers the Bladder, Womb, and the *Rectum* or strait Gut. The lower Part of the *Hypogastrium* is called *Pecten* or *Regio Pubis* ; its sides *Inguina* or Groins. The sides of the *Hypogastrium* are called *Ilia*, either because they contain almost all the Gut *Ileum*, or because they terminate at the lower Part of the *Os Ilium*. The *Inguina* or Groins are below the *Ilia*, where there is a Part of the Muscle *Cremaster*, with the Produ-

ctions of the *Peritoneum*. The hind Part of the *Abdomen* is called the Backside; it reaches from the last Ribs to the extremity of the *Os Sacrum*. It is divided into two Parts, the upper is called the Small of the Back, its sides the Loins; the middle of the lower Part is called *Radix*; at its lower end is the *Anus*, and its sides the *Nates* or Buttocks. The *Perineum* is the space between the *Anus* and the *Scrotum* or *Vulva* in Women.

Of the External Parts of Generation in Men.

Those that are Proper to Men, are the Yard and the *Scrotum*. The Extremity of the Yard is called the *Glans*: the *Preputium* or Fore-Skin is the Skin doubled which covers the *Glans* like a Hood. The *Frenum* or Bridle is a little whitish coloured Ligament, which ties the Fore-Skin and the *Glans* together beneath. The edge of the *Glans* where the *Preputium* begins, is called *Corona* or Crown. The *Urethra* is the Canal which runs along the under side of the Yard, thorow which the Seed and the Urine pass. The *Rapha* or Ridge is a Line, which running along the under side of the Yard, divides the *Scrotum* and *Perineum* in two; its length is from the *Frenum* to the *Anus*. It is not ordinarily cut in the Operation for the Stone; first, because it's harder than any other Part of the Skin there, and then you cut upon the
the

the Interstices of two Muscles, which make the reunion the difficulter. The *Scrotum* is the Purse which contains the two Testicles.

The External Parts of Generation proper to Women, are the *Vulva* or great Chink situated below the *Os Pubis*, and covered with Hair; above this, there is a little Swelling made by some Fat under the Skin, which is called *Mons Veneris*. The *Labia* or Lips of the great Chink are only the Skin swelled by some fat underneath; these being a little separated, there appear the *Nymphæ*, one on each side of the Chink; they are two small pieces of Flesh, resembling the Membranes that hang under the Throats of Pullets. In the middle and upper Part of the great Chink within, is the *Clitoris*, which is a small, round, and long body covered with a little hood of the Skin called *Præputium*. At the further end of the *Clitoris* there is a little hole, which is the Orifice of the Neck of the Bladder, and below that are the *Glandule Myrtiformes*, situated in the *fossa magna*, or *Navicularis*, which is the lower Part of the *Vulva*, where there is a Ligament called the Fork, which is torn in the first Birth. The bottom of the *Vulva* is the orifice of the Neck of the Womb.

Of the External Parts of Generation in Women.

Of the External Parts of the Arms, Fore-arms and Hands.

The Arm is from the Joint of the Shoulder to the Elbow, which is the place where we bend our Arm. The Fore-arm is from the Elbow to the Wrist or *Carpus*, which is the Articulation where the Fore-arm ends. The Hand is all that which is betwixt the Wrist and the ends of the Fingers. The Parts of the Hand are the *Metacarpus*, which is from the Wrist to the root of the Fingers; the outside, which is the Back of the Hand, and the inside, which is the Palm of the Hand; the *Mons Veneris* is the fleshy Part of the Hand nigh the Thumb; the Finger next the Thumb is called the *Index* or Fore-finger, then follows the middle, the Ring-finger, and the little one. Upon the Extremities of the Fingers are the Nails, the white Spot which is at the root of the Nails is called *Onyx*.

Of the External Parts of the Thigh and Leg.

The Thigh is from the Haunch to that Joint of which the Fore-part is called the Knee; the Back-part the Ham.

The Leg is from the Knee to the *Tarsus*; its Fore-part is called the Shin, and the Back-part the Calf of the Leg; the Eminences which are at its Extremity nigh the *Tarsus*, are called the Ankles of the Foot, they are two, the outer and inner; the *Tarsus* is from the Ankles to the *Metatarsus*, or breadth of the
the

the Foot, which goes to the root of the Toes; the upper part of the Foot is called Instep, the under Part the Sole of the Foot; the Toes are five in number, with their Nails.

S E C T. III.

Of the Common Parts or Teguments of the Epiderma or Cuticula.

THE first of the Common Parts is the *Cuticula* or Scarfskin, called by the Greeks *Epiderma*. It is a thin, fine, and close Membrane, a little Diaphanous, and without sense; it covers all the true Skin to which it is adherent: It is formed in the Womb, and grows in Proportion to the rest of the Parts; yet it has neither Veins, Nerves, nor Arteries. It is pierced by an infinite number of holes, for the passage of Sweat and insensible Transpiration: Its figure, length, and breadth is equal to that of the Skin: Its use is to cover the Skin, to make it smooth and equal, to be a Medium to the sense of touching, which otherwise could not be performed without Pain, if the impressions of the Objects were made immediately upon the Fibres and Nerves of the Skin. The thicker and harder it is, the duller is the sense of touching, and the transpiration the less: the thinner, clearer, and smoother

Of the Skin.

smoother it is, 'tis so much the more beautiful. *Leuwenhoeck* thinks that the *Cuticula* is nothing but the Excretory Channels of the Miliary Glands of the Skin, as the Scales are in Fishes.

S E C T. IV.

Of the Skin.

The Parts of
the Skin.

WE remark in the Skin, the Scarfskin being raised, Three Parts. The First is an infinite Number of *Papillæ Pyramidales*; they are the Ends of all the Nerves of the Skin, each of which are enclosed in two or three Covers of a Pyramidale Figure, and these Covers are each above another. They may be easily seen and separated in the Skin of an Elephant, and in the Skin of the Feet of several other Animals. Between these *Papillæ* are an infinite number of holes, which are nothing but the Orifices of the excretory Vessels of the Miliary Glands underneath. The Second Part is a web of nervous Fibres and other Vessels differently interwoven, it is always covered with a mucous Substance, which serves to support and moisten the *Papillæ Pyramidales*, and it is the *Parenchima* or that part of the Skin that the Parchment is made of. The Third Part is an infinite number of Miliary Glands, about which there is much fat; they

lie

lie under the other two Parts, they separate the matter of Sweat and insensible transpiration. Each Gland receives a Nerve and Artery, and sends out a Vein and excretory Vessel, which last passes thorow the other two Parts to the *Cuticula*, for the discharging the Body of this Matter, and for the moistening the *Cuticula* and the *Papille Pyramidales*, that they may not be dry, which would very much hurt the sense of touching. Upon the surface of the Skin there are many Parallel Lines, which are cut by as many Parallel ones. These Intersections make spaces of a Rhomboidale figure; and upon the Ends of the Fingers, these Lines are Spiral. There is a Pore, with a hair, in the most part of the Intersections; the more there are of these Lines, and the deeper they are, the rougher and the more wrinkled is the Skin. The Skin is six times thicker than the Scarfskin: And in the Sole of the Foot it is much thicker than in the Face, Hands, and other Parts. In the Summer it is thinner and softer, because the Pores are wider. In the Winter it is more compact and harder, because the Pores are more close; therefore the hairs of Beasts stick faster, and Furs made of them, are better in that Season. In some the Skin is white, in others black and tawny, which probably comes from the different

*The thickness
of the Skin.*

*The use of the
Skin.*

different colours of the Mucosity which covers the *Parenchima* of the Skin ; for the Fibres of the Skin in all are white, and there is little or no difference in the colour of different Bloods. The Skin has communication with all the rest of the Body, by the Veins, Nerves, Arteries, and Lymphaticks, which it receives from all Parts of the Body in abundance. Its Use is to cover and wrap up all the Parts of the Body, to be the Organ of the sense of touching, and the emunctory of the whole Body.

S E C T. V.

Of the Hair.

THE Hair may justly be reckoned one of the common Teguments of the Body, not only for its Use, but also because it is to be found upon all the Parts of the Body, except the Soles of the Feet and Palms of the Hands. It grows longest upon the Head, Beard, in the Arm-Pits, and about the Privities. When we examine the Hairs with a Microscope, we find that they have a great resemblance with Plants : for they have each a round bulbous root which lies pretty deep in the Skin, and which draws their Nourishment from the surrounding Humours, and therefore they grow after Death. In some places 'tis apparent they

they receive a small twig of a Nerve. The Hairs themselves appear hollow, which is also confirmed by the *Plica Polonica*, in which Distemper the Blood drops from their Extremities; they are generally of a triangular figure, and their different colours depend much upon the different temperaments and quantity of the Humours that nourish them. The use of the Hairs is for a Covering and Ornament to the Body; whatsoever the efficient Cause may be why a Man has a Beard and a Woman none, it is certain, the final Cause is for the distinguishing the Male from the Female Sex, which otherwise could hardly be known, if both were dress'd in the same Habit.

S E C T. VI.

Of the Fat.

THE Fat which is another of the common Teguments of the Body, is an oily and sulphureous Substance, contained in a number of little membranous Cells, which being look'd upon with a Microscope, resemble the Cells of Honey-combs, only they are not so regular, being they are somewhat flat, and almost of an oval figure. The Membrane of which these Cells are composed is very thin and transparent, and seems
to

to be only a continuation or production of the *Membrana Adiposa*, to which it closely adheres: This *Membrana Adiposa* lies under these Cells, and in a manner is their basis and support. From this Membrane arise a great number of Veins, Arteries, and Nerves, which divide into an infinite number of branches, which terminate in the *cellula adiposa*.

The Vessels of
the Fat.

Malpighius has discovered a Net of small Vessels, which he calls *Ductus adiposi*, because they are full of Fat; these he supposes, bring the Fat into the Cells; but he could never discover from whence they take their rise. There are also a number of little Glands, which are accompanied with Lymphatick Vessels, which carry back any Serosity that is superfluous. The Fat is to be found immediately under the Skin, in all the Parts of the Body, except in the Forehead, Eye-lids, Lips, upper part of the Ear, Yard, and *Scrotum*; but in all the other Parts of the Body there is more or less; there is much about the Heart, the Kidneys, the Intestines, the Thighs, the Glands and the Joints. There are two sorts of Fat, one white, or rather yellow, soft, and lax, which is easily melted, called *Pinguedo*; Another white, firm, brittle, and which is not easily melted, called *Serum* or Tallow. Some reckon

Two sorts of
Fat.

reckon the Marrow of the Bones for a third sort of Fat.

The chief Use of the Fat is to hinder *The Use of the Fat.* a too great Exaltation of the Salts: for there is nothing which sweetens so much the Acrimony of exalted Salts, as greasy and oily Substances; therefore it is found almost thorow all the Body, that it may be taken up by the Veins, to blunt and sweeten the too great sharpness and Acrimony of the Salts, which are in the Blood. The Fat which is about the Glands has the same use, in respect of the Lymphæ; and that which is about the Kidneys, may serve to preserve their Basen--against the Salts of the Urine. The Fat serves sometimes for the nourishment of the Body, and for the entertaining of the Natural Heat. Hence it is that the Dormouse and other Creatures live, during a whole Winter, without any other Food. It serves also to moisten and souple the Parts, for facilitating their Motion; to fill up the Interstices of the Parts, that the Skin may be smooth and beautiful; to defend the Body against external Cold; and in fine, to hinder too great a dissipation of the Spirits.

S E C T. VII.

Of the Membrana Adiposa, Carnosa, Communis, and Propria Musculorum.

What a Membrane is.

A Membrane is a web of several sorts of Fibres interwoven, for the covering and wrapping up of some Parts. Their membranous Fibres give them an Elasticity, whereby they can contract and closely grasp the Parts they contain, and their nervous Fibres give them an exquisite sense, which is the cause of their contraction; therefore they can scarcely suffer the sharpness of Medicines, and they are difficultly united, where there is a solution of continuity, or loss of their Substance. In their texture there are a number of small Glands, which separate an humour fit for moistening the Parts which they contain.

A distinction of Membranes.

Those that cover the solid Parts, are properly called Membranes; and they have their particular Names, as the *Peritoneum*, which wraps up all that is contained in the *Abdomen*; the *Pleura*, that which is in the *Thorax*; the *Periostium* the Bones, and the *Pericardium* the Heart. Those which form the Coats of Vessels, and which contain the Humours, as those of the Veins, Arteries, Stomach, Bladder, Intestines, Testicles, &c. are called Tunics or Coats: And those which

Of the *Membrana Adiposa*, &c.

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which cover and embrace the Brain, as the *Dura* and *Pia Mater*, are called *Membranes*. Of all these Kinds of *Membranes*, some are thin, and some are thick; and the same *Membrane* is thick in some places, and thin in other places, as in the *Membrana Adiposa*, which is thicker in the Neck than in any other Part of the Body. The Use of the *Membranes* is to cover and wrap up the Parts; to strengthen them; to save them from External Injuries; to preserve the Natural Heat; to join one Part to another; to sustain small Vessels, and the Nerves which run thorow their Duplicatures; to stop the returning of the Humours in their Vessels, as the Valves stop the returning of the Blood in the Veins and Heart; of the Chyle in the Lacteals and Thoracick Duct; and of the Lympha in the Lymphatick Vessels.

The *Membrana Adiposa*, which is said to be the basis of the *Cellula Adiposa* is double, and may be divided into two Parts, the one is External, thorow which there are a number of little Cells, full of Fat; the other is Internal, which Anatomists have mistaken for the *Membrana Carnosa*, because it has a greater number of blood Vessels.

Anatomists do generally assert, that there is a *Membrana Communis Muscularum*,

*The Use of the
Membranes.*

*The Membrana,
Adiposa,
and Carnosa.*

*of the Mem.
Com. Musc.*

Of the Mem-
brana Propria
Musculorum.

Of the Mem-
brana Com-
munis Vascu-
lorum.

rum, being led into that Mistake by the Aponeurosis of several Muscles; whereas, upon stricter Observation, there is no such thing to be found. The *Membrana Propria Musculorum*, is that which covers immediately all, and every one of the Fibres of a Muscle, and is closely attached to them. There is another called *Membrana Communis Vascularum*, which is a thin Membrane, and accompanies almost all the Vessels of the Body. All these Membranes receive Veins, Arteries, and Nerves from the Parts which are nearest to them.

C H A P. II.

Of the Lower Belly.

S E C T. I.

Of the Muscles in General.

The Definition
of a Muscle.

Of the fleshy
Fibres.

A Muscle is a bundle of fleshy and often tendinous Fibres, of which all in the same Plane are Parallel to one another, and they are all enclosed by one proper Membrane. The fleshy Fibres compose that Part, which is called the Body or Belly of the Muscle; they are red, lax, and spongy, containing

aining a number of small Cavities : they are tied together by a number of small and short Threads, which go from Fibre to Fibre, called Membranous Fibres. The Tendinous Fibres compose the two Extremities; they are called the Head and Tail, or the two Tendons of the Muscle; they are white, hard, compact, and closely bound together, that which makes them less than the body of the Muscles. In every Tendon, there are as many tendinous fibres, as there are fleshy Fibres in the body of the Muscle; so that every fleshy Fibre answers, at both ends, to a tendinous Fibre, to which they are always join'd obliquely, making equal and alternative Angles. The Surface of the Belly of the Muscles resembles a Rhomboides or Lozenge, to whose opposite Sides the Tendons are joined at oblique and alternative Angles.

Muscles are either Simple or Composed; the Simple have all their Fibres parallel, and in the same Direction. The Composed have the fleshy Fibres of several Planes crossing one another, or of different Directions; and they may be divided into as many simple Muscles as there are Planes, whose Fibres have different Directions. The Strength of a Muscle consists in the Union of many Fibres. The Motion of a Muscle is always

Of the tendinous Fibres.

The Division of Muscles.

always towards its Centre. The Tendons are sometimes double and triple, as the *Biceps* and *Triceps*. Sometimes several Muscles join in one Tendon, as the *tendo Achillis*. Sometimes one Muscle has two Bellies, as the *Digastricus*.

We find also Muscles without Tendons, as the *Quadratus* of the Fore-arm, and several of the Face, Tongue, and Lower Jaw; and they are only inserted into the *Periostium*; whereas those that have Tendons are inserted into the body of the Bone. There are others which have only Tendons at one end, as may be seen in the Myology. This makes me suspect that Tendons are only for the conveniency of having a great number of Fibres inserted about a small Bone. Those who would have a more particular Description of the Muscles may consult *Steno*, where they will see how a Muscle may swell without the addition of any New matter, only by the change of their Angles.

The Muscles have Nerves, Veins, Arteries, and Lymphaticks, as other Parts: their use is to bend and extend, and to perform all the motions of the Parts.

S E C T. II.

Of the Muscles of the Lower Belly.

HAVING raised the Skin and Fat, the the Muscles of the Lower Belly appear, which are Five Pair in Number; the first of which that presents it self, is the *Obliquus externus* or *Descendens*; it takes its Origination from the two last true, and the five false Ribs, by five or six Digitations, betwixt the teeth of the *Serratus major*, from the upper and forepart of the Spine of the *Ilium*; its Fibres, descending obliquely, are inserted all along the *Linea alba* under the *Musculi recti*; and to the forepart of the *Os Pubis*. It has a large *Aponeurosis*, which covers both it's self and the *Musculi recti*. The *Linea alba* is a Line which reaches betwixt the *Cartilago Xiphoides* and the *Os Pubis*, made by the union of the Tendons of the Oblique and Transverse Muscles, dividing the *Abdomen* in two in the middle. This Muscle receives a twig of a Nerve from the Intercostals at each of its Digitations.

The second Pair is the *Obliquus ascenden*s or *Internus*, whose Fibres are disposed in a contrary manner, crossing the former obliquely; they arise with a large and fleshy beginning, from the Circumference of the *Ilium*, from the *Os*

Obliquus externus.

Obliquus internus.

Os Pubis : Above they are fixed to the Cartilaginous Part of the false Ribs, and they are inserted all along the *Linea alba*.

Transversalis.

The third Pair is the *Transversalis* ; it lies under the two former, it arises from the *Cartilago Xiphoides*, from the Extremities of the false Ribs ; from the transverse *Apophyses* of the *Vertebrae* of the Loins ; it's fixed to the inner side of the Spine of the *Ilium*, and is inserted in the *Os Pubis*, and *Linea alba*.

These three Muscles unite their Tendons as they approach the *Linea alba* ; they are pierced in the middle of the *Linea alba*, for the Passage of the Umbilical Vessels. They are also pierced above the *Os Pubis*, for the Passage of the Spermatick Vessels in Men, and the round Ligaments of the Womb in Women. These holes are not opposed to one another : that which is in the *Transversalis* is highest, that in the *Obliquus ascendens* is a little lower, and that in the *Obliquus descendens* lowest. It is this last which is only cut in the Operation of the *Bubonocoele* ; it has a fine and thin Membrane that closes exactly its ring or hole, through which the Vessels pass.

Rectus.

The fourth Pair which is covered with the *Aponeurosis* of the *Obliqui*, is the *Musculus Rectus* ; it arises from the *Sternum*, the Extremity of the last true Rib.

Rib, from the *Cartilago Xiphoides*, and goes straight down the middle of the *Abdomen* to be inserted in the *Os Pubis*.

This Muscle has three or four Interventions, which when the Muscle acteth, serve to render the compression equal, which otherwise would be all in the middle. It has Veins and Arteries which creep on its inside, from the Mammillary and the Epigastrick Vessels, which are supposed to have Communication, that the Blood may return by the Mammillary Veins, when the Passage is stopt by the Epigastrick, which are compressed in Women big with Child.

The fifth Pair is the *Pyramidalis*, so *Pyramidalis*. called because of their Figure: they arise with a fleshy beginning, from the outer and upper part of the *Os Pubis*, and growing narrower and narrower, are inserted into the *Linea alba*, sometimes near to the Navel. Sometimes one, and sometimes both of these Muscles are wanting. The Use of all the Muscles of the Lower Belly is to compress all the Parts that it contains, for the filtration and distribution of the Chyle, for the expulsion of the Excrements, all of them help the expiration by making the *Diaphragma* mount up; and the *Obliqui* help to pull down the Ribs for the contracting

The use of these Muscles.

of the *Thorax*; they help to bend the Trunk forwards. By the admirable Contrivance of their Fibres decussating one another, every point of the Lower Belly is sufficiently compress'd, so as that the Intestines can slip no where from the Compression.

S E C T. III.

Of the Peritonæum.

Its Description.

AFTER the Muscles of the Lower Belly are raised, comes the *Peritonæum*. It is a thin and soft Membrane, which encloses all the Bowels contained in the Lower Belly, covering all the inside of its Cavity. Its external Superficies is unequal where it adheres to the transverse Muscles. The Internal is very smooth and polish'd. It has a number of small Glands that separate a Liquor, which supple the Intestines, and facilitates their motion. When these Glands are obstructed, the *Peritonæum* grows thick, as may be seen in several Dropsies.

The upper Part of this Membrane covers the Midriff, to which it closely adheres, the forepart of it sticks to the Transverse Muscles, and *Linea alba*; the lower part of it to the *Os Pubis*, and the back part of it to the *Os Sacrum* and *Vertebra* of the Loins. 'Tis a double

double Membrane, and contains in its Duplicatures the Umbilical Vessels, the Bladder, the Ureters, the Kidneys, and Spermatick Vessels, to all which it gives a Membrane, as also to the Liver, Spleen, Stomach, Intestines, and Womb.

Its external Membrane has two Productions, like to two Sheaths, which pass thorow the rings of the oblique and transverse Muscles in the Groin, for the passage of the Spermatick Vessels in Men, and for the round Ligaments of the Womb in Women. These Productions being come to the Testicles in Men, dilate and form the *Tunica Vaginalis*. *Its Productions.*

The *Peritonæum* has Veins and Arteries from the *Phrenica*, from the Mammary, the Epigastrick, and often from the Spermaticks. Its Nerves are of those which are distributed in the Muscles of the *Abdomen*. By the elasticity of its Fibres, it easily dilates and contracts in respiration and conception. If it breaks, it causes a Rupture either in the Groin or Navel. Its Use is to contain the Bowels of the *Abdomen*, and to give each of them an outer coat. *Its Vessels.*

S E C T. IV.

Of the Navel.

THE Navel is a knot in the middle of the *Abdomen*, made by the Union of the Umbilical Vessels, which are cut after the Birth of the *Fœtus*: These Vessels are, the Umbilical Vein, which goes from the Navel by the fissure of the Liver, to the *Vena Porta*; the two Umbilical Arteries which pass by the sides of the Bladder, to the Iliack Arteries; the *Urachus* which goes betwixt the two Arteries to the bottom of the Bladder: these Vessels turn dry after the Child is Born, being of no use. They are all contained betwixt the doubling of the *Peritoneum*. We shall speak of them more afterwards.

S E C T. V.

Of the Omentum.

THE *Omentum*, otherwise called *ἐπίπλωον*, in English, *Caul*; lies under the *Peritoneum* above the Intestines; 'tis composed of two very fine Membranes, betwixt which its Vessels, Fat, and Glands are contained. At one Extremity, it is tied to the hollow side of the Liver, to the backside of the *Duodenum*, to that part of the
Colon

Colon that lies under the Stomach, to the *Its Descrip-*
 Back and Spleen, from thence descen-
 tion.
 ding below the Navel, it turns up
 again and ascends as high as the Sto-
 mach, where its other Extremity is
 again tied to the hollow side of the
 Liver, to the forepart of the *Duodenum*
 and *Pylorus*, to the bottom of the Sto-
 mach and to the Spleen; so that it
 resembles an Apron whose end is turned
 up as high as the Girdle. Sometimes
 it descends as low as the *Os Pubis*,
 which with the Dilatations of the
 Productions of the *Peritonæum* causes
 an *Epiplotele*.

The Caul receives Veins from the *Its Vessels*.
Porta, which are the *Gastro-epiploicæ*
dextra & sinistra, and the *Epiplotele*,
 Arteries from the *Cœliaca* and *Mesen-*
terica, and Nerves from the *Intercostal*.
 Which Vessels with some small Glands
 and much Fat contained in proper and
 distinct Cells (as hath been said above)
 lies betwixt the Membranes of the Caul.
 The Fat is gathered chiefly about the
 Vessels, and the Membranes of the Caul
 are transparent, and full of small holes
 where there is no Fat. *Malpighius*
 says, that he has seen the Veins and
 Arteries, which come from the Sto-
 mach and Spleen, woven like Nets, and
 upon them run the *Ductus Adiposi*,
 which terminate in the little Globes of
 Fat,

Fat, but they were so very small, that he could not discover whether they were hollow or not; yet he thinks that they are Canals for carrying the Fat, because he has found them in Beasts very like to small Guts, equally big in all their extent. This same Author doubts whether this sort of Vessels which are spread thorow all the Fat of the Body, come from the Caul by means of the *Membrana Adiposa*, which may be a common source to both.

Its use.

They give several uses to the Caul, as to cover the bottom of the Stomach and of the Intestines, that by cherishing their heat, it may promote Digestion, and help the Concoction of the Chyle: to strengthen and sustain the Vessels which go from the Spleen, to the Stomach, Intestines, Pancreas, and Liver, to keep a store of the Fat, that it may be received by the Veins and Lymphaticks, for the use we have spoken of; to supple the Superficies of the Guts for facilitating their Peristaltick Motion.

The Caul is very subject to Corruption, particularly if it be exposed to the Air, therefore in Wounds of the Lower Belly, when the Caul comes out, Surgeons take care to cut off all that is mortified of it. It grows sometimes very fat and heavy; *Vezalins* says,

Of the Oesophagus.

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says, he has seen One of fifty Pound weight, altho' ordinarily it weighs no more than half a Pound. *Bartholine* saw another all fleshy in the Hospital of *Leyden*.

S E C T. VI.

Of the Oesophagus.

THough the *Oesophagus* belongs not properly to the Lower Belly, yet because of its connexion with the Stomach, it will not be unproper to describe it here.

The *Oesophagus*, or Gullet, is a long, *Its Situation.* large, and round Canal which descends from the Mouth, lying all along betwixt the *Aspera Arteria* and the *Vertebra* of the Neck and Back, to the fifth *Vertebra* of the Back, where it turns a little to the right, and gives way to the *Aorta Descendens*, and both run by one another till at the ninth, the *Oesophagus* turns again to the left, climbs above the *Aorta*, and descending above it, it pierces the Midriff, and is continued to the left Orifice of the Stomach.

The Gullet is composed of three *Its Coats.* Coats; The First and Internal, which covers all the Cavity of the Gullet, is made of nervous Fibres diversly interwoven; this Coat at its upper end doth

join the internal Membrane of the Mouth and Lips, therefore in Vomiting these Parts are affected, and at its lower end it covers the left Orifice of the Stomach internally for three Fingers breadth : This Coat is soft and downy towards the Cavity ; but more at the Orifice of the Stomach, than it is any where else.

The Second Coat of the Gullet is very thick and fleshy, it resembles a true Muscle, its Fibres run in two Spiral Lines which cross one another : by the Motions of this Coat, the Peristaltick Motion of the Gullet is performed.

The Third and outermost, which covers the other two, is very thin, composed of small and slender membranous Fibres, it comes from the *Pleura*.

Among these Coats there are some small Glands, whose excretory Channels open in the Cavity of the *Oesophagus*, for the moistening of it. The Gullet at its upper end receives an Artery from the *Aorta*, and it sends a Vein to the *Azygos* : At its lower end it has an Artery from the *Celiaca*, and it gives a Vein to the *Coronaria* of the Stomach. Its Nerves are from the eighth Pair.

The

The upper end of the Gullet is called *The Muscles of the Pharynx*. It has two pair of Muscles for its Motion. The First is the *Stylo-pharyngeus*. This is a small and round Muscle, which arises fleshy from the root of the *Processus Styloides*, and descending obliquely, it is inserted into the sides of the *Pharynx*. When this Muscle acteth it pulleth up and dilateth the *Pharynx*.

The Second is the *Oesophagus*. Its Fibres have several Directions; its superior Fibres arise from the *Processus Pterigoidens* of the *Os Sphenoides*, and from the *Cornua* of the *Os Hyoides*, and run obliquely to the back-part of the *Pharynx*; the Fibres which are below these arise from the sides of the *Cartilago Scutiformis*, and run transversely to the middle of the back part of the *Pharynx*, where both superiour and inferiour Fibres from both sides unite and form a tendinous Line. When this Muscle acts, it draws the back part of the *Pharynx* to its forepart, by which it not only straitens it for the depressing of the Aliment, but it compresses also the *Tonsilla* which send out their Liquor, which lubricates the Aliment whereby it glides the more easily down into the *Stomach*.

Its Glands,

There are two Glands which are tied on the backside of the Gullet about the fifth *Vertebra* of the Back, by the branches of Nerves which come from the eighth Pair. These two Glands are like two Kidney-beans tied together; they receive Veins and Arteries from the *Coronarie*, and they have Lymphatick Vessels which discharge themselves into the Thoracick Duct. Their use is to defend (as some say) the Gullet against the hardness of the *Vertebra*, and to moisten its Cavity for facilitating the descent of the Aliment. But it's more likely that these Glands are for separating a Lympha from the Blood, as others do. *Bartholine* remarks that these Glands sometimes swell so big as to hinder the descent of the Aliments into the Stomach.

Its use.

The use of the Gullet is to carry the Meat from the Mouth into the Stomach, by means of the Muscles of the *Pharynx*, and fleshy Fibres of the *Gula* which perform its Peristaltick Motion.

S E C T. VII.

Of the Stomach.

Its Situation.

THE Stomach, *Ventriculus*, or *gástron*, lies immediately under the Midriff,

riff, the Liver covers a part of its right Side, the Spleen touches it on the left Side, and the *Colon* at its bottom, to which also the *Caul* is tied. Its figure *Its Figure.* resembles a Bag-pipe, being long, large, wide, and pretty round at the bottom, but shorter and less Convex on its upper part, where it has two Orifices, one at each end, which are somewhat higher than the middle between them. The Superior or left Orifice is called *Kardia*, to it the *Oesophagus* is joined. By this Orifice the Aliments *Its Orifices.* enter the Stomach, where being digested they ascend obliquely to the *Pylorus* or right and inferior Orifice, which is united to the first of the Intestines. At this Orifice the Tunicles of the Stomach are much thicker than they are any where else, and the inmost has a thick and strong Duplicature, which serves as a Valve to the *Pylorus* when it contracts and shuts.

The Stomach is made of four Mem- *Its Coats.* branes or Coats ; The first and inmost is made of short Fibres, which stand perpendicularly upon the Fibres of the next Coat ; they are to be seen plainly towards the *Pylorus*. This Coat is much larger than the rest, being it is full of Plaits and wrinkles, and chiefly about the *Pylorus* : These Plaits retard the Chyle, that it run not out of the Stomach

mach before it be sufficiently digested. In this Coat there are also a great number of small Glands which separate a Liquor, which besmeares all the Cavity of the Stomach; therefore this Coat is called *Tunica Glandulosa*.

The Second is much finer and thinner; it is altogether nervous; it is of an exquisite sense, and it's called *Nervosa*.

The Third is Muscular, being made of straight and circular Fibres; the straight run upon the upper Part of the Stomach, between its superior and inferior Orifices, and the circular run obliquely from the upper part of the Stomach to the bottom. These Fibres by their Contraction and continual Motion help the attrition and digestion of the Aliments.

The Fourth Tunicle is common, it comes from the *Peritonæum*.

Its Vessels.

The Stomach receives Veins from the *Porta*, viz. the *Gastrica*, *Pylorica*, and *Vas breve*, and branches from the *Gastro-epiplois dextra & sinistra*, which are accompanied with branches of the *Arteria Coeliaca*, all which lie immediately under the fourth Coat of the Stomach.

The Eight pair of Nerves or *Par vagum*, gives two considerable branches to the Stomach, which descending by the sides of the Gullet, divide each into
two

two branches, the External and Internal. The two External branches unite in one, and the Internal do so likewise, both which piercing the Midriff, form, by a great number of small twigs, upon the upper Orifice of the Stomach, a *Plexus*, and then the Internal branch spreads its self down to the bottom of the Stomach : and the External branch spreads it self upon the inside about the upper Orifice of the Stomach. This great number of Nerves, which is about the upper Orifice, renders it very sensible, and from them also proceeds the great Sympathy betwixt the Stomach, Head, and Heart; upon which account *Van Helmont* thought, that the Soul had its seat in the upper Orifice of the Stomach.

The *Plexus Nervosus* of the *Hypochondria* and *Mesenterium* give several branches to the bottom of the Stomach, therefore in Hysterick and Hypochondriack Passions the Stomach is also affected.

The Use of the Stomach is Digestion, which is the Dissolution or Separation of the Minute Parts of the Aliments, not only by the *Saliva* and *Succus* of the Glands in the bottom of the Stomach, but also by the continual motion of its muscular Fibres ;
and

and when this Aliment is sufficiently dissolved in the Stomach, it is by these same Fibres thrown out at the *Pylorus* into the Intestines.

S E C T. VIII.

Of the Intestines.

*What the Guts
are.*

THE Intestines or Guts are a long Canal, which being knit all along the Circumference of the *Mesenterium*, by several Circumvolutions, reaches from the *Pylorus* to the *Anus*. They are six times the length of the Body in which they are: By which means the Chyle has time enough to be separate from the *feces*, before they are cast out at the *Anus*. They are composed of three Coats. The inmost is nervous, and very sensible; it is full of circular wrinkles and Plaits which retard the motion of the Chyle and descent of the Excrements. It is covered with a mucous sort of crust, which defends it against the Acrimony of the Bile. In this crust there are an infinite number of small Glands; they are placed as it were by Plotouns in the small Guts, but in the great Guts they are fewer, and are placed one by one; they lie only in that side of the Intestine which is knit to the Mesentery. Some say, that they have each

Their Coats.

each an excretory Duct which pours into the Cavity of the Intestines a white Liquor, which serves to hasten the Separation of the Chyle from the *Feces*; others think that they separate the mucosity which besmears the inside of the Intestines; and a third opinion drawn from their situation, and the Liquor which is found in them, is that they are only Caruncles placed at the Mouths of the Lacteal Veins.

The second Coat is made of Spiral and straight Fibres. The Spiral Fibres contract the Cavity of the Intestines when they act, and the straight Fibres shorten the Intestines when they contract.

The third and External Coat is common, it cometh from the *Peritoneum*.

Tho' the Intestines be one continued Pipe, yet Anatomists divide it into six Parts, three thin and small, and three thick and great. The three thin and small, are the *Duodenum*, *Jejunum*, and *Ileum*. The *Duodenum* is the first Part of the Intestines: it's about twelve fingers breadth long; it is continued to the *Pylorus*, from which turning downwards, it runs under the Stomach immediately above the *Vertebrae*, towards the left side, and ends at the first of the windings under the *Colon*. At its lower

*The Division
of the Guts.*

*Of the Duo-
denum.*

lower end there are two Canals which open in its Cavity, one comes from the Liver and Gall bladder, called *Ductus communis Cholidochus*, the other from the *Pancreas*, called *Ductus Pancreaticus*. The first brings the Bile; the second the *Succus Pancreaticus* into this Intestine. It differs from the other two in this, that its Passage is straiter and its Coats thicker.

Of the Jejunum.

The Second is the *Jejunum*, it begins at the first winding of the Guts under the *Colon*, where the *Duodenum* ended; and making several turnings and windings, from the right side to the left, and from the left again to the right, it is continued to the *Ileum*, filling all the upper part of the Umbilical Region, being about 12 or 13 hands breadth long. It differs from the *Ileum* only in this, that it hath some more *Vena Lactea*, into which the Chyle passing, it is found always more empty, therefore it's called *Jejunum*: And the folds or membranous circles of its inner Coat are nearer to one another, and in greater number than in the *Ileum*.

Of the Ileum.

The Third and last of the small Guts is the *Ileum*, it is about 21 hands breadth long; it begins where the *Jejunum* ends, and making several turnings and windings, it fills all the lower part of the Umbilical Region, and all the

the space betwixt the *Ilia*, and is continued transversely, not in a streight line, to the beginning of the *Colon* in the right side; its Passage is a little narrower than that of the *Jejunum*, and its Coats seem somewhat thinner.

This Intestine, because of its situation, falls easily down into the *Scrotum* by the Productions of the *Peritoneum*. In it also happens the *Volvulus*, when one part of this Gut enters the Cavity of another.

The thick and great Guts are the *Cacum*, *Colon*, and *Rectum*.

The *Cacum*, altho' small, yet is taken for the first of the great Guts; but the Ancients, who made this Division of the Guts, called the beginning of the *Colon* the *Cacum*, and what is now called *Cacum*, they called *Appendix Caci*. It is four or five fingers breadth long, and about the bigness of a Swan's Quill. It is called *Cacum*, because it is open only at one end., by which it is tied to the beginning of the *Colon*, to which it seems to be an *Appendage*; so that the Excrements go in and come out at the same Orifice. Its other end which is shut is not tied to the Mesentery, but to the right Kidney, by means of the *Peritoneum*. Its use is yet unknown. Some take it for a second Stomach, others for a receptacle of

Of the *Cæcum*.

of the Excrements of the *Fœtus* in which it's always full, till after the Birth. Others say, it contains a ferment, and others the flatuosity of the Intestines; and others, that it separates a Liquor by some Glands which are in its Cavity; which Liquor serves to harden the Excrements as they pass thorow the *Colon*.

Of the Colon.

The *Colon* is the greatest and widest of all the Intestines, and about eight or nine hands breadth long. It begins where the *Ileum* ends, in the Cavity of the *Os Ilium* on the right side, from whence ascending by the Kidney of the same side, it passes under the Concave side of the Liver, to which it is sometimes tied, as likewise to the Gall Bladder, which tinges it yellow in that place, then it passes under the bottom of the Stomach to the Spleen in the left side, to which it's also knit, from thence it turns down to the left Kidney, and then passing in form of an *S* it ends at the upper part of the *Os Sacrum* into the *Rectum*.

At the beginning of this Gut there is a Valve formed by the Production of the inmost Coat of the Intestines in this place, it hinders the Excrements which are once fallen into the *Colon* to return again into the *Ileum*. In its Cavity, there are a great number of
Cells

Cells or membranous Circles formed by its internal Coat, they retard the Passage of the Excrements, that we may not be obliged continually to go to Stool. The fleshy Fibres of its second Coat, are greater and stronger than those of the other Intestines, because a greater strength was requisite to cause the Excrements to ascend. It has a strong Ligament which runs along its upper side, from the *Ileum* to the *Rectum*; it ties the membranous Cells together, and strengthens the *Colon* against the weight of the Excrements and force of Flatuosities: In these things it differs from the other Intestines.

The *Rectum* is the last of the Intestines: It is a hands breadth and a half long; its Cavity is about three fingers in diameter; its Coats are thicker than those of the *Colon*. It begins at the upper part of the *Os Sacrum*, where the *Colon* ends, and going straight down, it is tied to the extremity of the *Coccyx* by the *Peritoneum* behind, and to the Neck of the Bladder in Men, and in Women to the Neck of the Womb before, from thence comes the Sympathy between these Parts. There is very much Fat about its external side, therefore it is called the Fat Gut. Its Extremity forms the *Anus*, into which there are three Muscles inserted. The first

Of the Muscles
of the Rectum.

first is the *Sphincter Ani*, this is a fleshy Muscle, about four fingers Broad, composed of Circular Fibres, which embrace the Extremity of the *Rectum* for three fingers height, and which hangs over the Extremity of the *Rectum*, another fingers breadth; so that in the Operation for a *Fistula in Ano*, there is always an Inch more of this Muscle cut than there is of the *Rectum*. It is connected forwards to the *acceleratores Urinae* in Men, and to the Neck of the Womb in Women, and backwards to the *Os Coccygis*. Its use is to shut the Passage of the *Anus*, which the weight of the *feces* open.

The other two Muscles are the *Levatores Ani*; they arise from the Internal and Lateral side of the *Os Ischium*, and are inserted into the *Sphincter Ani*. They draw the *Anus* upwards. A Palsy of the *Sphincter* causes an involuntary running of the Excrements, and a Palsy of the *Levatores* causes a descent of the *Anus*.

Of the Vessels
of the Guts.

The Intestines receive Veins from the *Porta*, which are distributed in many small branches, called *Meseraicae*. Another branch creeps along the *Colon* to the *Anus* called *Hæmorrhoidalis*, it is accompanied by an Artery of the same Name. The Hypogastrick Veins and Arteries give them also some branches: And

And the *Mejenterica Superior* and *Inferior* accompany the branches of the Veins.

The Nerves which are distributed in the Intestines, come from the Intercostal. The *Anus* receives some also from the *Os Sacrum*; they carry the Animal Spirits necessary for the Peristaltick Motion of the Guts.

The Aliment which was dissolved in the Stomach, being thrown into the *Duodenum*, is mixt with the Bile and Pancreatick Juice, which not only dissolve and attenuate it further, but they also precipitate its grosser Parts or Fæces, whilst its finer Parts are, by the pressure of the Midriff, Muscles of the lower Belly, and contraction of the Muscular Fibres of the Intestines, thrust into the Mouth of the lacteal Vessels. The Fæces are, by the successive motion of the Spiral Fibres, and contraction of the streight ones, thrust from one Part of the Intestines into another, till at last they are thrown out at the *Anus*. This Motion of these Fibres, is called the Peristaltick Motion of the Guts.

The use of the Guts

S E C T. IX.

Of the Mesentery, Lacteal Vessels, and
receptacle of the Chyle, and Ductus
Thoracicus.

The Descrip-
tion of the
Mesentery.

THE Mesentery is a triple Membrane, placed in the middle of the Abdomen, almost of a circular figure, with a narrow Production, to which the end of the Colon and beginning of the Rectum are tied. It is about four fingers breadth and a half in Diameter, its Circumference being full of Plaits and Foldings, is about three Ells in length; the Intestines, which are tied about this Circumference, are about eight or nine Ells long, so that to every Inch of the Circumference of the Mesentery, there are three Inches of the Intestines tied. It is strongly tied to the first and third Vertebra of the Loins. It's composed of three Membranes, the inner Membrane which is thicker than the other two, and upon which the Glands and Fat lie, and the Veins and Arteries run, is its own proper Membrane; and the other two which cover each side of the proper Membrane come from the Peritoneum.

Its Vessels.

The branches of the *Arteria Mesenterica Superior* and *Inferior*, which come from the *Aorta*, and the *Vena Mesenterica*,

Arteries, which come from the *Porta*, run upon its proper Membrane to the Intestines; the Nerves which come from the Intercostals, and some sprigs from those of the *Vertebrae* of the Loins make some *Plexus*, from which there goes an infinite number of small twigs to the Coats of the Intestines.

The *Vena Lactea* and Lymphatick Vessels run also through the Mesentery. In it there are also a great number of Glands, among which there is one bigger than the rest, near its centre, called by *Assellius Pancreas*: These Glands are surrounded with a great deal of Fat; the Lacteal Veins which come from the Intestines terminate in them, and other Lacteals arise from them, and go to the receptacle of the Chyle. Sometimes these Glands being obstructed, turn Schirrous and excessively big.

The Use of the Mesentery is to keep *its Use* the Intestines in order, and to sustain the Meseraick Veins, Arteries, Lacteal, and Lymphatick Vessels.

Assellius was the first who found out *Of the Vena Lactea*, in the Year 1622. *Lactea*. They are so call'd, because they are long, transparent Vessels, which appear white by the Chyle which they contain. They are so small as that they cannot be seen, but when they are full of Chyle. They

They are of
two Sorts.

They are of two Sorts ; the first sort are called *Radicales* or *Vena Lactea primi generis* ; they come by little branches from the Intestines, particularly from the *Jejunum* and *Ileum*, and they run betwixt the Duplicature of the *Mesenterium*, where they unite and form great branches, which go to the Glands in the *Mesenterium*.

The second Sort are called *Lactea secundi generis*, they come from the Glands in the *Mesenterium* by several branches, which uniting, form bigger branches which carry the Chyle from the Glands to the *Receptaculum*.

They have Valves at certain distances, as other Veins which hinder the Chyle to return into the Intestines.

The first Sort have their Orifices in the Cavity of the Intestines, covered with the slime and mucosity of the inner Tunicle of the Intestines, the Chyle which enters them is filtrated thorow the Glands which are in this Coat.

Of the Re-
ceptaculum
Chyli.

Assellius, and almost all thought, That the *Lactea* of the second Order carried the Chyle to the Liver : But *Pecquet*, who found out the *Receptaculum Chyli*, in the Year 1651. hath shewed by Ligatures, that they go not to the Liver, but to the *Receptaculum*.

This

This Receptacle is easily found in Bodies that are alive, but with a greater difficulty in those that are dead; it is of a Vesicular Substance, which is thicker in Men than in Beasts, but its Cavity is bigger in these than in those. *Bartholine*, opening two Bodies immediately after their Death, and about four Hours after they had Eat, observed three Glands, which he calls *Lumbares*: The first, which was the least, was situated under the right root of the *Diaphragma*; and the other two, which were bigger, were situated in the Angle made by the *Aorta* and *Emulgents*; they had Communication with one another by some Lacteal Vessels; these, (he thinks) were in stead of *Pecquet's* Receptacle.

From this Receptacle arises a Vessel of the Ductus Thoracicus. called *Ductus Thoracicus* which is sometimes found double. This Vessel ascends all along the *Vertebra* of the Back under the *Oesophagus*, between the *Azygos* and the *Aorta*, and discharges it self of the Chyle which it receives from the Receptacle into the left Subclavian Vein, by three or four small Pipes or Branches, which have every one, at their Orifices, a small Valve, which gives a free passage to the Chyle into the Subclavian, but which shuts and hinders it to return back again. This Duct is

D also

also called *Ductus Communis Lymphaticus*; because the Lymphatick Vessels discharge themselves into it. It has several Valves at certain distances, which further the ascent of the Chyle towards the Subclavian by sustaining of it, that it fall not back again into the Receptacle.

The use of the
Lactææ, and
Ductus Tho-
racicus.

The Chyle being pressed by the Peristaltick Motion of the Guts into the *Lactææ* is received into the Receptacle, from whence it is forced by the pressure of the Intestines and action of the Muscles of the lower Belly into the *Ductus Thoracicus*, which carries it to the left Subclavian Vein to be carried with the Blood to the Heart.

S E C T. X.

Of the Glands in General.

THE Modern Anatomists have reduced all the Glands of the Body to two Sorts, viz. *Glandulæ Conglobatæ*, and *Glandulæ Conglomeratæ*.

Of the Glandulæ Conglobatæ.

The *Glandulæ Conglobatæ* are formed by the several turnings of one or more particular sorts of Vessels closely tied together, and wrapt up in one common Tunicle: Such are the Testicles and Epididymides.

Of the Conglomeratæ.

The *Conglomeratæ* are such as are composed of many little Glands, each of

of which is covered with its own proper Coat, has its own proper Excretory Vessel, which sometimes uniting with the rest, form one or more Excretory Ducts, and they are all closely tied to one another by Vessels and Membranes, and all covered with one common Membrane; such are the *Pancreas*, the Liver, the *Salivares*, &c.

The use of the Glands is to separate the Humours, such as the Bile, Urine, Spittle, and others from the Blood, which is brought to them by the Arteries. And tho' of this there can be no Controversy; yet what the inward Structure of the Glands is, and how they separate these Humours is very much disputed by Anatomists. There are some who will not have the Glands to differ from one another, nor yet from other Vessels, except only in this; That their Orifices or Cavities are of different Figures; that is, they are either Triangular, Quadrangular, Septangular, or such like. Others again think, That the Arteries and Veins are but one continued Canal, and that at the Extremity of the Artery or beginning of the Vein, there goes out a Vessel called the *Excretory Duct*, through which the Humour passes, and these Ducts have circular Orifices, which differ from one another only in mag-

nitude. The Learned *Bellinus* ingeniously imagines, That a Gland is only a single Cylindrical Tube, which may be either Straight, Spiral, or otherwise Crooked; from which there goes one or more Excretory Ducts, as the *Venæ Lactææ* go from the Intestines. This Tube at one end is continued to the Artery, and at the other to the Vein, both which are of a Conical Figure.

There are as many or more Opinions about the way the Humours are separated. The Ancients maintained that it was done by Ferments: but as these Ferments must mix with the Blood, to separate the Humours from it; so they must be exhausted, and there must be another Ferment to separate more, and another to separate this; and so on *ad infinitum*. Besides, it is impossible, That any Liquor can lie in any particular place (as the Ferments are supposed to be) through which other Liquors run continually, and not be carried away with the moving Liquors. Upon these Considerations, the Learned *Bellinus*, in his Treatise, *De motu Cordis & Bilis*, thinks, That the Air might be this Ferment. But besides, that it may be doubted, whether there is any Air in the Blood, or not: it will be hard to conceive: how the same Ferment and the same Structure of Glands can separate different

rent sorts of Liquors in the several Parts of the Body. But I wish he had been more particular, and explained his Opinion more fully. Those who maintain, that the Glands have Pores or Cavities of different Figures say, that none but Bodies of such Figures can enter them; and therefore such and such Liquors are always separated in such and such Glands. But if they did consider, that Liquors are Susceptible of all Figures, and that membranous Tubes will yield to any Figure, and that all Bodies of a lesser Diameter than that of the Gland may pass through, they would have little reason to be of this Opinion. Those who think, that the Glands differ only in magnitude, say, That only Liquors of such and such Magnitudes can pass through such and such Glands, have no reason to brag of it: for if the Bile is made of Parts, which are bigger than those of the Urine, and the Parts of the Urine bigger than those of the Spittle, then the Spittle may pass where the Urine passes, and both may pass through the Glands of the Liver: Besides, there is no Liquor which has not smaller and greater Parts, so that Parts of the grossest Liquors would be found separate in the finest Glands. It were tedious to run over all the Opinions

which are published upon this Subject. The Ingenious Dr. Cockburn, has given us one in his *Oeconomia Animalis*, drawn from the different Velocities of the Blood, which certainly ought to be considered in this Affair.

S E C T. XI.

Of the Pancreas, and Succus Pancreaticus.

Of the Pan-
creas.

THE *Pancreas* or Sweet-bread, is a Gland of the Conglomerate sort, being composed of a number of Glands, all wrapt up in one common Membrane. It is situated betwixt the bottom of the Stomach and the *Vertebrae* of the Loins; it lies across the *Abdomen*, reaching from the Cavity of the Liver to the Spleen; it's strongly tied to the *Peritoneum*. It weighs commonly four or five Ounces. It is about six fingers breadth long, two broad, and one thick. Its Substance is a little soft and supple; every little Gland has a small excretory Vessel, which uniting all together, form one common Duct about the bigness of a Quill, clear and transparent, like to a Lymphatick Vessel; this Duct runs all along the middle of the *Pancreas*, and opens into the Cavity of the *Duodenum*, at its lower end, where there is a little Caruncle at its Orifice. Some-

Of the Ductus
Pancreaticus.

Sometimes it joins the *Ductus communis Cholidochus*, and then both open at one Orifice into the *Duodenum*. This Canal was first found by *Virtungus*, and is called *Ductus Pancreaticus Virtungi*.

The *Pancreas* has Veins from the Splenick branch, Arteries from the *Cæliack*, Nerves from the Intercostal. Its use is to separate a Liquor not acid, but of the same Nature as the *Saliva*, for the further Concoction and Chylification of the Aliments.

Of the Vessels
of the Pan-
creas.

SECTION XII.

Of the Liver and Gall Bladder.

THE Liver lies under the right *Hypochondrium*. Its Convex and upper side reaches a little beyond the *Cartilago Xiphoides*, and touches the *Diaphragma*; its Concave and under side covers the *Pylorus* and part of the Stomach: As also a part of the *Colon*, all the *Duodenum*, a part of the *Jejunum*, and of the *Omentum*. When we stand, its Extremity goes near to the Navel.

Its Situation.

The Liver is almost round, and pretty thick. Its upper side is Convex, smooth, and equal; the other side is Concave, but not so equal. In its middle and forepart it is divided into two,

Its Figure.

by a fissure, where the Umbilical Vessels enter. The Gall-bladder is fastened to its under side, where there are three Eminences that the Ancients called *Portæ*, of which one passes for a little Lobe. When it is full of Blood, it is of a dark red colour; when the Blood is washed out of it, 'tis pale and soft.

Its Connexion. It is fastned in the Body by three Ligaments: The first ties it to the *Diaphragma*, from which it comes and penetrates the Substance of the Liver, into the *Capsula* of the *Porta*, where it is join'd by the Umbilical Vein. The second is the Umbilical Vein; it comes from the Navel, and enters by the great Fissure of the Liver to join the *Porta*: After the Birth, it degenerates into a Ligament, but is of little use for the fastening the Liver. The third is slack but strong, it comes from the Common Membrane of the Liver, and is tied to the *Xiphonoid Cartilage*.

Its Membrane. 'Tis covered with a common Membrane from the *Peritonæum*, besides that every Lobe and Gland has its proper Membrane.

Its Substance. The common Membrane of the Liver being raised, its Substance appears, which is composed of several Lobes of Glands, of a Conick figure, not easily to be distinguished in the Liver of Men. These Lobes are disposed all along the sides

sides of each branch of the Vessels in the Liver ; they are every one covered with a proper Membrane, and tied to one another by other Membranes, in such a manner, as that they leave also little Intervals betwixt them, which are more visible in Fish, and other imperfect Animals. Every Lobe receives small Vessels : and tho' we cannot see where they end ; yet we may presume that they go to the little Glands of which each Lobe is composed.

The Vessels of the Liver are, the *Vena Cava* and the *Porta*. They are accompanied with many small branches of the Arteries, which come from the *Cœliack* and *Mesenterica Superior*, which two bring the Blood for the nourishment of the Liver : The *Porta* brings the Blood full of Bile for Secretion, and the *Cava* carries back the Blood that remains from both.

The *Vena Porta* and the *Cava* enter the Liver by its Concave side, and are equally distributed thorow all its Substance ; where ever there is a branch of the one, there is a branch of the other ; so that each Lobe, and each Gland in the Lobe, whether on the Convex or Concave side, receive the same Vessels. The *Vena Porta* discharges, by the extremity of its branches, the Blood as yet full of Bile, into the little Glands,

D 5

which

Of the Liver and Gall-Bladder.

which form the Lobes, of which the *Parenchyma* of the Liver is composed, where being separated from the Bile, (which is taken up by the Biliary Vessels, which accompany the branches of the *Porta*, and carried to the Gall-Bladder or *Duodenum*) it is carried back by the branches of the *Cava*.

It receives its Nerves from the *Plexus Hepaticus* of the Intercostal Nerve.

Besides these Vessels, the Liver has Lymphaticks, which (according to *Malpighius*) come from the conglobulated Glands under its common Membrane on its Concave side; they carry the *Lympha* from the Glands to the *Receptaculum Chyli*.

The Excretory
Vessels of the
Liver.

Of the Gall-
Bladder.

We come now to the Excretory Vessels of the Liver, which are, the *Vesicula fellis* and *Porus Biliaris*. The *Vesicula fellis* or Gall-Bladder, is fixed to the Concave side of the Liver. Its Figure is like that of a Pear; 'tis of a different bigness almost in every Subject; the biggest is about the bigness of a little Hen-egg: When the Liver is in its natural situation, the bottom, or largest Part of the Bladder is downwards, and the Neck or narrowest Part upwards; and then it touches the Stomach as well as the *Colon*, where it frequently dyes them yellow. This Bladder is composed of three Coats, the

the outermost is common to it with the Liver; the next which is proper to it, is thick and solid, composed of transverse, oblique, and straight Fibres. The third is thin and nervous. This last Coat is covered within by a kind of crust or mucous, which preserves it against the Acrimony of the Bile. *Malpighius* has remarked some little Glands between its Coats, where the Cystick Arteries end, which gave him ground to think that it was the same in the *Porus Biliaris*. The Bladder is tied to the Liver at its Neck, by several small Vessels, which are spread in several Lobes of the Liver, accompanying some branches of the *Porta* and *Cava*. These small Vessels do commonly unite in one or two Bodies, and enter the Neck of the Bladder, they bring the Bile from the Liver into the Bladder. At the Neck of the Bladder there is a little fibrous ring, which dilates and contracts as a Sphincter for the letting out, or keeping in of the Bile.

The *Ductus Cysticus* is a Conduit from the Neck of the Bladder to that Part where the *Porus Biliaris* joins it; 'tis of the bigness of a Goose quill. These two together make the *Ductus communis Cholidochus*, which goes obliquely to the lower end of the *Duodenum*, or beginning of the *Jejunum*.
After

Of the *Ductus Cysticus*.

After it has pierced the first Coat, it runs near two fingers breadth between the Coats, before it opens in the Cavity of the Intestine; which oblique insertion serves instead of a Valve to hinder the Bile to return into the *Ductus Communis*, having once entered the Intestine.

The Gall-Bladder has two Veins from the *Porta*, which are called *Cystica Gemellæ*. It has some small Arteries from the *Celiacæ Dextra*, and some Lymphaticks.

Of the Porus
Biliaris.

The *Porus Biliaris* is another Excretory Vessel of the Liver. It has as many branches as the *Vena Porta*, which it accompanies thorow every Lobe and Gland in the Liver, wherever there is a branch of the one, there is a branch of the other; and these two are enclosed in one common Capsule as in a sheath the use of this Capsule is to facilitate the Motion of the Blood and Bile, which otherwise would be too slow, if they were not hastened by the Contraction of this Capsule. All these branches unite, and make one trunk of the bigness of a small Quill, which joins (as we have said) at the end of the *Ductus Cysticus*, for the carrying the Bile from the Liver to the Intestines, by the *Ductus communis Cholidochus*.

The

Of the Liver and Gall Bladder.

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The insertion of the *Porus Biliaris* into the *Ductus Cysticus*, is oblique with its Mouth looking towards the *Ductus Communis*, by which means it is impossible that the Bile which comes from the *Cystus* can enter the *Porus*.

The *Porus Biliaris* is found in the Liver of all Animals. It is not so with the *Vesicula fellea*. The Hart, Camels, Goats, Dolphins, Sea-Calves, Pigeons, and many others have it not.

The Bile which is found in the Gall-Bladder, is thinner, and different from that which is in the *Porus Biliaris*. This *Malpighius* proves by an Experiment, which is, that having tied the *Ductus Cysticus*, he remarked that the Bile which came by the *Porus Biliaris*, was of a different taste, smell, colour, and consistency, from that in the Gall-Bladder.

The Blood which is brought by the *Vena Porta* into the Liver, being separated from its Bile by the Glands which compose the Substance of the Liver, is carried back by the *Vena Cava*, whilst the Bile is partly taken up by the biliary Vessels, which open in the Neck of the Gall-Bladder, and partly by the branches of the *Porus Biliaris*; from both which it runs by the *Ductus communis Cholidochus* into the *Duodenum*, to attenuate and perfect the Chyle, and
to

The use of the
Liver and
Bile.

to precipitate its grosser Particles by Fermentation.

*The Analysis
of Bile.*

In the Bile, there is more fix'd than volatile Salt, a little Sulphur, and a little Earth, much Phlegm. Volatile Spirits, Alkali's, and Acids, mixt with it, cause no Alteration, nor Fermentation, the Acids only precipitate a little Earth in it.

SECT. XIII.

Of the Spleen.

*Of the Situation,
Connexion and Shape
of the Spleen.*

THE Spleen is situated in the left *Hypochondrium*, under the *Diaphragma*, between the Ribs and the Stomach, above the left Kidney: It is tied to the *Peritonæum*, to the Stomach, and to the *Omentum*. It is of a blewish or leaden colour, of an oblong figure, thick at the edges, not thin as the Liver. It has two Membranes. The External comes from the *Peritonæum*. The Internal is proper to it.

Of its External Membrane.

The External is pretty strong, it has Nerves from the Intercostal, and Veins from the Splenick branch of the *Porta*, as it enters the Spleen, which form a sort of *Plexus* upon this Membrane.

Some of its Arteries come from the branches that are in the Internal Substance of the Spleen. It has a great number

number of Lymphatick Vessels, which draw nearer to one another as they approach that part where the Veins and Arteries enter the Substance of the Spleen, to discharge themselves of a yellowish coloured *Lympha*, into the *Receptaculum Chyli*. There are more of them upon a Calf's Spleen than upon a Man's.

The Internal Membrane is finer and thinner than the External: for if you blow into the Splenick Artery, the Air shall pass thorow the one, but not the other; its Fibres are not irregularly woven, as those of other Membranes seem to be, but they come from innumerable Points, as Rays from so many Centres; and the Fibres of one Point are regularly woven, with the Fibres of the Points surrounding it. It receives Veins, Nerves, and Arteries from those that enter the Spleen.

Of the Internal Membrane.

The Substance of the Spleen is not only kept together by its common Membranes, but also by innumerable Fibres which come from the Points of the internal Membrane, and are inserted in the Points of the opposite side of the same Membrane, the Expansion of the Extremity of these Fibres seem to compose the Internal Membrane.

The

Of the Sub-
stance of the
Spleen.

The Substance of the Spleen is composed of an Infinity of Membranes, which form little Cells and Cavities of different figures and bigness, which communicate with one another, and which are full of little Glands.

The Membranes which form these Cells, come from the Internal Membrane of the Spleen, but *Malpighius* thinks rather from the *Sinus Venosus*, by which they all communicate, not only at the Extremities of the Capillary branches, but also at some small holes, which are in the Trunk and great branches of this Vein, which open immediately into the Cells; these Membranes are nourished by the Capillary Arteries, which frequently make small *Plexus* upon them.

Of its Glands.

These membranous Cells are full of small Glands, of an Oval figure, a soft substance, and a white colour. They seem to be hollow in the middle. There are seven or eight of them together which hang at the Extremities of the Nerves and Arteries as so many little Grapes.

Of its Veins.

The Spleen has Nerves, Veins, and Arteries, which no sooner enter its Substance than they are received in one common *Capsula*, which contains not only their great Trunks, but all their branches. This *Capsula* is thick in that
side.

side that the Nerves and Arteries lie on; but thin, and liker a Net than a Membrane, on the side that the Vein lies on.

The Splenick Vein comes from the *Porta*: before it enters the Spleen it has two Coats, the inner fine and thin, the outer strong and thick, which goes no further than the internal Membrane of the Spleen, with which it unites. This Vein is divided into three or four branches, each of which send out others at a certain distance by two and two, and all these end in the Cells of the Spleen. In its great branches on the opposite side, to that whereon the Arteries and Nerves lie, there are many little holes which open immediately into the Cells (as we have said before) it is not the same in the Arteries.

The Splenick Artery comes from the *Cœliaca*. As soon as it enters the Spleen, it is divided into as many branches as the Vein which it accompanies thorow all its Substance, and its Capillary branches terminate in the Cells and Glands.

The Nerves are two from the *Plexus Nervos. Splenicus*; they accompany the Arteries with which they are included in a particular Capsule which comes from the common Capsule; they inosculate several times, and form a sort of Net upon their particular Capsule. The

*The use of the
Spleen.*

The true use of the Spleen is yet unknown. The Ancients thought that it was the receptacle of the Melancholick humour, some considering that in the Spleen there are a great number of Membranes and Fibres, and also many Nerves, think that the Blood is attenuated, and becomes more spirituous in the Spleen; and considering that the most of the Blood in the Liver comes immediately from the Spleen and *Omentum*, they think that the one furnishes the Oleaginous, the other the Spirituous part of the Bile. This Opinion seems pretty probable, but then to what end are the Glands in the Spleen? others therefore to give an use to the Glands think that they separate a Liquor from the Nerves and Arterial Blood, which is carried by the *Porta* to the Liver. But then to what end is a Liquor separated from the Blood to be immediately mixt with it again? Nature has given to the Glands every where else their proper Excretory Vessels, by which we know their several uses; and till we discover those of the Spleen, it's probable we shall be ignorant of its true use.

S E C T. XIV.

Of the Kidneys, Glandulæ Renales,
Ureters and Bladder.

THE Kidneys are two in Number, Of the number and figure of the Kidney. one on each side; they have the same figure as the Kidney-beans; their length is four or five fingers breadth; their breadth is three, and their thickness two; the right is under the Liver, and the left under the Spleen. In a *fœtus* their External Substance is divided into several Lobes join'd together, which in Adults become more close; therefore their Superficies is equal and smooth; they have two Membranes, the one common from the *Peritoneum*, the other proper; they are ordinarily covered with much Fat; their colour is a dark red.

We observe. in the Kidneys, Lymphatick Vessels which discharge themselves into *Pecquet's* Reservatory, Nerves which come from the Intercostals, Veins from the *Cava*, Arteries from the *Aorta*. Of their Vessels.

These Veins and Arteries are called Emulgents; they enter the Reins by their Concave sides, (which lies nearest the *Cava* and *Aorta*) included in one Capsule, and are divided into several branches, which surround the *Pelvis*. These branches

branches are again divided into an infinity of others less, which go to the external Part of the Reins, where they join by several *Anastomoses*; and form a sort of Net, from which their Extremities coming, terminate in an infinity of little Glands.

Their Substance.

These Glands are of a round figure, they compose the outer Substance of the Reins, which is half a finger thick. From each of them there goes a long and small Tube, these Tubes compose the inner Substance of the Reins. As they approach the *Pelvis* or *Bason*, they gather together in little bundles, whose Extremities piercing the Membrane of the *Pelvis*, form those little Protuberances on the inside of the *Pelvis*, called *Papilla*. The *Pelvis* or *Bason* is a Cavity in the middle of the Kidneys covered with a Membrane, which is a dilation of the Ureters; and from the External side of this Membrane go several membranous *Appendices* towards the External Substance of the Kidneys. In their way they form a sort of Net-work, which divide the Urinary Tubes into bundles, and which make a sort of *Capsula* to the Blood Vessels.

Of the Pelvis.

The use of the Kidneys.

The use of the Reins is to separate the Urine from the Blood, which by the motion of the Heart and Arteries is thrust into the Emulgent branches.

branches, which carry it to the little Glands, in which the Serosity, being separated, is received by the Orifice of the little Tubes, which go from the Glands to the *Pelvis*, from whence it runs by the Ureters into the Bladder. The Blood which was carried into the Glands, and which could not enter their excretory Tubes, is brought back by the emulgent Veins.

In the middle between the *Aorta* and the Kidneys, a little above the emulgent Vessels, are situated the *Glandulæ Renales* or *Capsulæ Atrabiles*. They are two in number, one on each side wrapped up in some Fat; they sometimes change their situation, and their figure is also various; for in some they are round, in others oval, square, triangular, of a trapeze or irregular figure; the right is ordinarily bigger than the left; and each about the bigness of a *Nux Vomica*: In a *fœtus* they are always almost as big as the Kidneys. They are covered with a fine Membrane, and they have a pretty large Cavity, in which there is found a blackish sort of Liquor. Their colour without is like a red drawn upon brown, but within it is a more lively red. There are some little holes in their Substance, which open into their Cavity.

Of the Glandulæ Renales.

The

Their Vessels
and use.

The Emulgent Vessels, and sometimes the *Cava* and *Aorta*, send them one or two branches of Veins and Arteries. The intercostal Nerve furnishes a branch, which makes a Plexus upon them. Their use is not yet known. They seem to separate a Liquor from the Arterial Blood before it goes to the Reins, for the liquefying the Blood which is too thick after it comes from them.

Of the Ure-
ters.

The Ureters are two long and small Canals which come from the Basons of the Kidneys, one on each side; they lie betwixt the doubling of the *Peritoneum*, and descending in the form of an S; they pierce the Bladder near its Neck, where they run first some space betwixt its Coats, and then they open in its Cavity.

They have two Coats, one common from the *Peritoneum*, the other proper which is very sensible; they have Veins and Arteries, and Nerves from the Intercostals, and from those which come from the *Vertebrae* of the Loins. Such as are subject to the Gravel, and given to excessive Drinking, have them sometimes so much dilated, that you may put the end of your little Finger into them. Their use is to carry the Urine from the Reins to the Bladder. Their Obstruction causes a suppression of the Urine.

Thee

The Bladder is a Vessel of the figure Of the Bladder. of a Pear, situated between the Duplication of the *Peritonæum*, in the lower Part of the *Abdomen*, between the *Os Sacrum* and the *Os Pubis*, above the straight Gut in Men, and the Neck of the Womb in Women: It's tied to the Navel by the *Urachus* degenerated into a Ligament, and its sides to the Umbilical Arteries; its Neck to the *Intestinum rectum* in Men, and to the Neck of the *Matrix* in Women. Its Substance is composed of three Coats. The first is from the *Peritonæum*. The second is composed of straight, circular, and transverse Fibres for its Contraction; And the third is Nervous and full of wrinkles, for facilitating its Contraction and Dilatation. This last is covered with a viscus and slimy Matter, which defends it from the acrimony of the Salts in the Urine. Its Neck is longer in Men than in Women, where it has a little Muscle, called *Sphincter*, whose Fibres are circular, its use is for shutting the Orifice of the Bladder. The Body and Neck have Veins and Arteries from the *Hypogastrick*, Nerves from the *Intestinales*, its use is to be a Reservoir of the Urine.

Such Animals as have no Bladder, have no Spleen, as Lizards, Camels, and others.

others. We find in the Urine much Phlegm and volatile Salt, a little Sulphur, Earth, and fixt Salt.

S E C T. XV.

Of the Parts of Generation proper to Men.

THE Vessels and Parts of Generation proper to Men are, The *Vasa Preparantia*, the *Testes*, the *Epididymedes* or *Parastata*, the *Vasa Ejaculatoria*, the *Vesiculæ Seminales*, the *Prostata*, and the *Yard*.

*Of the Vasa
Præparantia.*

The *Vasa Preparantia* are four in number, two on each side; which are, one Vein and one Artery. The Vein on the right side comes immediately from the *Cava*, a little below the Emulgent; that on the left side comes from the Emulgent, because if it came from the *Cava*, it must needs cross the *Aorta*, which by its frequent beating would quickly break it, or at least stop the motion of the Blood in it. The Vein on the right side, as soon as it comes from its Trunk, gives some branches to the *Peritoneum* and *Omentum*. The Arteries come both immediately from the *Aorta*, about two fingers breadth below the Emulgent Arteries.

As soon as the Veins and Arteries are come from their Trunks, they pierce

pierce the inner Membrane of the *Peritoneum*; and being both wrapt up in the same Coat, they descend above the Muscle *Psoas*, betwixt the two Membranes of the *Peritoneum*. The Vein divides and unites several times, and so by diverse Divisions, it passes with the Artery thorow the rings of the transverse and oblique Muscles, within the Productions of the External Membrane of the *Peritoneum* to the Testicles, and four fingers breadth above them, it begins to form the *Corpus Varicosum* or *Pyramidale*, which is a Pyramidale Figure made by the Divisions of this Vein, whose basis is upon the Testicles, these Veins are full of Valves.

The Artery divides only in two branches, three or four fingers breadth above the Testicle, upon which the greater branch is bestowed, by which many small branches are spread thorow all its Substance, the lesser goes to the *Epididymides*. There descends also with these Vessels into the Testicles, two branches of the Intercoastal Nerves, and of the twenty one of the Spine, which carry Animal Spirits to the Testicles; besides these Veins, Arteries, and Nerves, the Testicles have also Lymphaticks, which discharge themselves into the common Receptacle.

Of the Scro-
tum.

The Testicles are contained in the *Scrotum*, which is composed of two Membranes, besides the Scarfskin; The First is the Skin, which is thin, and without Fat in this place, but full of Veins and Arteries. The Second is called *Dartos*; it's a thin Membrane made up of fleshy or muscular Fibres, by means of which the *Scrotum* is wrinkled and contracted. There are some Men who can contract and dilate it, when, and as they please. The *Scrotum* is divided in the middle by a thin Membrane, which separates the two Testicles. When the *Scrotum* is little and contracted, it is a sign of health; its use is to contain both the Testicles.

Of the figure
and bigness of
the Testicles.

The Testicles are not always found in the *Scrotum*; they are sometimes (tho' rarely) in the *Abdomen*: They are of an oval figure, the bigness of a little Hen's Egg; they are two in number; I know those who have three.

The Testicles have two Coats; some Authors say, three.

Of the Tunica
Vaginalis.

The First is called *Elythroides* or *Vaginalis*, formed by the Dilatation of the Productions of the external Membrane of the *Peritoneum*; its internal Superficies is smooth, its external rough; it contains the *Vasa Praparrantia* and
Dese-

Deferentia; it embraces loosely the whole Body of the Testicle. This Tunicle is almost all covered by a Muscle called *Cremaster*, which rises from the *Os Pubis*, and spreading its Fibres upon the *Elythroides*, it suspends the Testicles, and draws them up in the act of Generation.

The Second is that which covers immediately the Testicles. It is called *Albuginea*, because of its white colour. It is strong and thick, very smooth and equal, the Coats of the *Vasa Preparantia* are united to it. Of the Albuginea.

The Substance of the Testicles which formerly was thought to be a sort of Marrow, is nothing but the folding of several small Vessels, which have no conspicuous Cavity, disposed in such a manner, that if they could be separate from one another, without breaking them, they might be drawn out to a great length. These Foldings are separate from one another by thin Membranes, which come from the inner side of the *Albuginea*. At the end of the Testicles, they send out six or seven small Vessels, which piercing the *Tunica Albuginea*, unite into one Canal, which by several turnings and windings upon the upper part of the Testicles, forms this Body which we call *Epididymis*. They are covered with a Of the Substance of the Testicles.
Of the Epididymis.

Of the Vasa
Deferentia.

thin Production of the *Albuginea*. The same Canal continuing and ascending from the Extremity of the *Epididymedes*, forms the *Vasa Deferentia* or *Faculatoria*, one from each *Epididymis*, about the bigness of a Goose-quill, with a conspicuous Cavity; as they ascend within the *Tunica Vaginalis*, they make several Serpentine turnings and windings; then, they enter by the holes of the transverse and oblique Muscles into the *Abdomen*, and marching over the Ureters, between the back-side of the Bladder and the *Rectum*, they grow larger as they approach the *Vesicula seminales*, (which discharge their humour into them) where they come close to one another, and growing again smaller and smaller, they pass thorow the *Prostata*, and open into the *Urethra*, a little below the Neck of the Bladder, where each Orifice has a spongy border, which hinders the involuntary running of the Seed; they may sometimes be mistaken by Surgeons for a Carnosity of the Yard.

The Spermatick Arteries carry the Blood from the *Aorta* to the Testicles, which separate that Part of it which is fit for Seed. The Veins carry back to the *Cava* what Blood remains, after the Secretion of the Seed, and the Nourishment

rishment of the Parts. The Seed is further purified in the *Epididymides* and in coition is carried by the *Vasa Deferentia* into the *Urethra*.

The *Vesiculæ Seminales* are two in Number, one on each side, situated betwixt the Bladder and the straight Gut, tied to the one and the other by a Membrane of fleshy Fibres, which in time of Coition, swells and presses the *Vesicula*. They are covered with a pretty thin Membrane, upon which do creep many branches of Veins, Arteries, Nerves, and Lymphaticks. Their External Surface resembles that of the Intestines of a little Bird, which in some places of their Circumvolutions are broad, in others narrow; they are about three fingers breadth long, their broadest part is about an inch, from which they grow narrower by little and little to their end which is next the *Prostata*. They have two considerable Cavities divided into membranous Cells, which open distinctly by two Orifices which are in their small Extremities, into the two *Vasa Deferentia*; into which they discharge a pretty thick and clear humour which embraces the true Seed which comes from the Testicles.

The *Prostata* or *Corpus Glandulosum*, Of the Prostatae. is situated at the Neck of the Bladder,

E 3

covered

covered with a Membrane made of muscular Fibres, as that of the *Vesicula*, and for the same use. It is about the bigness of a Walnut ; the *Vasa Deferentia* pass thorow its Substance, which is Vesicular and Glandulous, full of an oleaginous and viscous humour, which is carried into the beginning of the *Urethra*, by eight or nine excretory Ducts, which open about the Orifices of the *Vasa Deferentia* ; the border of their Orifices is also spongy, to hinder a continual running of this humour.

The *Prostata* have Veins, Arteries, Nerves, and Lymphaticks. They are the Seat of the *Gonorrhoeas* ; for if the morbifick Matter fixes in them, it enflames, corrodes, and ulcerates them ; from whence there is a continual running of purulent Matter.

Of the Yard. The shape, figure, and dimensions of the Yard are well enough known. It is covered with the Skin and Scarfskin. The Skin at the end of the Yard folds in, and forms a Hood to the *Glans*, called *Præputium*, which is fixed to the lower part of the *Glans* by a little Ligament called *Frenum*. The Substance of the Yard is composed of two nervous Bodies, called *Corpora Caverosa*, they arise at two different places, from the lower part of the *Os Pubis* ;

Pubis; a little from their root they come close together, being only divided by a Membrane, which at its beginning is pretty thick, but as it approaches the end of the Yard, it grows thinner and thinner, and the two nervous Bodies terminate in the *Balanus*. The External Substance of these nervous Bodies is hard, firm, close, and nervous; the Internal is membranous, loose, and spongy, full of Veins and Arteries.

The *Balanus* or *Glans* is only a continuation of the soft and spongy Internal Substance of the two nervous Bodies, covered immediately with a thin Membrane, which is a Dilatation of the Internal Membrane of the *Urethra*. About the Crown of the *Glans*, where the *Præputium* is contiguous to it, there are several small Glands which lie under its thin Membrane; they separate a whitish humour for the moistening the *Balanus*. In a *Phimosis* this humour not only hardens, but may grow acid, and ulcerate the *Glans*.

The *Urethra* is a Conduit which reaches from the neck of the Bladder to the end of the Yard, in the middle and lower part of the two nervous Bodies. Its Substance is externally hard, and internally spongy, like that of

the nervous Bodies, except a little at the neck of the Bladder, which is membranous. Within its Cavity is covered with a thin and exquisite Membrane, in which some have observed several Glands, which separate a Liquor for preserving it against the Acrimony of the Urine.

*Of the Vessels
of the Yard.*

The Yard has a small Ligament which arises from its back a little distance from its root, which ties it to the upper part of the *Os Pubis*, that it may not hang too low. It receives two branches of Veins and Arteries from the Hypogastrick Vessels; besides others from the *Pudenda* they are distributed thorow all the body of the Yard, particularly thorow the spongy Part of the *Corpora Cavernosa* and *Urethra*. The two Veins unite near its roots, and form one trunk which runs along the upper side of the Yard. It has two Nerves from the *Os Sacrum*, and several Lymphaticks, which empty themselves into the Inguinal Glands.

*Of its Muscles
and Erection.*

The Yard has two pair of Muscles. The First is the *Erectores*; they rise from the *Ischium*, a little below the roots of the two nervous Bodies, they lie upon them, and are inserted into them. The Second are the *Acceleratores*, they rise from the root of the *Urethra*; they have several Fibres which

which join the Fibres of the *Sphincter Ani*, they lie upon the *Urethra*, betwixt the two former, and are inserted into the nervous Bodies. When these Muscles act, they compress the Veins of the *Penis* against the *Os Pubis*, and so stop the Blood from returning, whilst the Arteries still bringing more, must necessarily swell and distend the spongy Part of the nervous Bodies, and *Urethra*, which is the true cause of an Erection; for if you stop the Veins of the Yard in any Cadaver, and inject a Liquor by the Arteries, the Yard shall swell as in a Natural Erection.

S E C T. XVI.

Of the Parts of Generation proper to Women.

HAVING given an exact Account in the First Chapter, of the Figure and Situation of the External Parts of Generation proper to Women; I shall here only examine their Substance and Use, and then proceed to the other Parts.

The *Clitoris*, which is in the upper part of the *Vulva*, is a long and round Body naturally about the bigness of the *Uvula*; it begins to appear well about 14 Years of Age; it is covered with a folding of the Skin of the *Vulva*, called

Of the Clitoris.

its *Præputium*. The Substance of the *Clitoris* is composed of two nervous Bodies, such as those of the *Yard*; they rise at two different places in the lower Part of the *Os Pubis*, and approaching one another, they unite and form the Body of the *Clitoris*, whose Extremity, which is of an exquisite sense, is called its *Glans*. The two nervous Bodies before they unite, are called the *Crura Clitoridis*; they are twice as long as the Body of the *Clitoris*. It has two Muscles, which rise from the Protuberance of the *Ischium*, and are inserted in its nervous Bodies. They erect the *Clitoris* in the Coition, after the same manner that the Muscles of the *Yard* do erect the *Yard*.

Its Muscles.

Its Vessels.

The *Clitoris* receives Veins and Arteries from the *Hæmorrhoidal Vessels* and the *Pudenda*, Nerves from the *Intercostals*, which are afterwards distributed thorow all the Parts of the *Vulva*. Remark that the Veins on the one side of the *Vulva* communicate with those of the other side, and so do the Arteries communicate with one another.

Of the *Nymphae*.

The *Nymphae* have been sufficiently described already. Their internal Substance is spongy and full of Blood Vessels, therefore they swell in the act of Copulation; they receive Vessels and Nerves as the *Clitoris*: Their Use is to defend

defend the internal Parts from external Injuries, to encrease the Pleasure in Coition, to direct the course of the Urine: they are bigger in married Women than in Maids.

The *Hymen* is a membranous Circle ^{Hymen} or Ring, at the Mouth of the *Vagina*; which being broke at the first Copulation, its Fibres contract in three or four places, and form what they call *Glandula Myrtiformes*.

A little beyond the *Clitoris*, in the upper part of the *Vulva*, above the Neck of the Womb, there is a little hole, which is the Orifice of the *Ure-* ^{Urethra} *thra*. It is naturally so large as to receive a Probe as big as a Goose-quill; it is covered within by a fine Membrane. The length of the Neck of the Bladder is almost about two fingers breadth. It has a little Muscle called its *Sphincter*, which embraces the *Urethra*, to hinder the involuntary running of the Urine; it joins the fleshy Fibres which are at the Orifice of the *Vagina*.

Between this Muscle and the inner ^{Lacune} Membrane, there is a white and glandulous Subitance, almost a finger breadth of thickness; it surrounds all the Neck of the Bladder; in it there are many little Excretory Vessels called *Lacune*, which discharge themselves of a viscus Liqueur, for the tickling of the Sex, into

into the lower part of the *Vulva*. This glandulous Body is the Seat of *Gonorrhœa's* in Women, as the *Prostate* are in Men; it has the same use that they have. It hath been found all ulcerate in Women which have had a *Gonorrhœa*.

Vagina.

The *Vagina*, or Neck of the Womb, is a long and round Canal, which reaches from the *Pudenda* to the internal Mouth of the Womb. In Maids 'tis about five fingers breadth long, and one and a half wide; but in Women who have born Children, its length and bigness cannot be determined, because it lengthens in the time a Woman is with Child, and it dilates in the time of Birth. It lies betwixt the Bladder and the *Rectum*, with which last it is wrapt up in the same common Membrane from the *Peritonæum*; for this reason the Excrements come out sometimes by the *Vulva*, when this Intestine is wounded.

The Substance of the *Vagina* is composed of two Membranes, of which the inner which lines its Cavity, is nervous and full of wrinkles, like the roof of the Mouth of an Ox, especially in its forepart. There are many little Vessels which pour into it a viscous humour in the time of Coition, of which we have spoken before..

The

The wrinkles of this Membrane, are for the Friction of the *Balanus*, to encrease the Pleasure in Copulation, to detain the Seed that it run not out again, and that it may extend in the time of Gestation.

The External Membrane of the *Vagina* is made of muscular Fibres, which (as occasion requires) dilate and contract, become long and short for adjusting its Cavity to the length and bigness of the Yard. At its lower part there is a Muscle of circular Fibres, like a Sphincter, and under it on each side of the *Vagina*, a Body composed of Vessels and Fibres which they call *Plexus Retiformis*; both of them help to straiten the Mouth of the *Vagina*, that it may grasp the Yard closely.

The Neck of the Womb receives Veins and Arteries from the Hypogastrick and the Hæmorrhoidal Vessels. Those from the Hypogastrick are dispersed in its upper part, and those from the Hæmorrhoidal in its lower part. These Vessels communicate with one another. Some of them open into the Cavity of the *Vagina*, and pour out part of the Blood which makes the Menstrua. It has Nerves from the *Os Sacrum*. Amongst other uses, the Neck of the Matrix serves for a Conduit to the Menstrua, and for a Passage to the Fœtus.

The

Of the situa-
tion of the
Matrix.

The *Matrix* or Womb is situated in the lower part of the *Hypogaster*, betwixt the Bladder and the straight Gut; the *Os Pubis* is a fence to it before, the *Sacrum* behind, and the *Ilium* on each side; they form as it were a basin for it; but because it must swell whilst a Woman is with Child, therefore they leave a greater space in them than in Men; it is for this reason that Women are bigger in the haunches than Men.

Of its Figure.

The figure of the Womb is like a Pear, from its internal Orifice to its bottom, 'tis three fingers long, two broad, and almost as much thick. In Maids its Cavity will contain a big Almond: It changes both figure and dimensions in Women that are with Child; it presses the Bowels, and reaches to the Navel towards their Delivery, whilst at other times it does not pass the *Os Sacrum*.

Of its Sub-
stance.

The Womb is covered with an external Membrane, which it receives from the *Peritonæum*. Its Substance is composed of fleshy Fibres, which are woven together like a Net, and they draw together and make several bundles which have several directions for the better contracting of the Womb in the expulsion of the *Fœtus*. The Spaces between these Fibres, are filled up with thin

thin and soft Membranes, which form an infinite number of Cells, upon which the Blood Vessels run; turning and winding in great abundance. Upon these Membranes, especially towards the Cavity of the Womb, there are several Glands which separate an humour to lubricate the Cavity of the Womb in the time of Pregnation.

The bottom of the Womb grows thick, as it dilates; so that in the last Months of Gestation, 'tis at least an inch thick, especially where the *Placenta* adheres, because of the abundance of Blood that is brought to it by the Arteries.

The entry into the Cavity, or the Mouth of the Womb, which joins the upper end of the *Vagina*, makes a little Protuberance in form of Lips, which resembles the Muzzle of a little Dog, it opens to receive the Seed in its Cavity, and shuts very exactly after Conception.

The Womb receives Veins and Ar- of it Vessels. teries from the Hypogastrick and Spermatick Vessels, they divide and creep along it by many turnings and windings, to the end they may not break when it dilates; the Veins on one side communicate by *Anastomosis* with the Veins on the other side: In like manner do the Arteries; many of them open

open in the inside of the Womb, and once every Month they pour out a little Blood, which runs thorow the *Vagina* out at the *Pudenda*; this Blood is called the *Menstrua*, or Courses; they begin about 14, and continue till about the 60. year of Age.

Its Nerves come from the Intercostals, and from those which come from the *Os Sacrum*. There are also several Lymphaticks upon its outside, which unite by little and little into great branches, and discharge themselves in the Reservoiratory of the Chyle.

Of its Ligaments.

The Womb is tied by two sorts of Ligaments, by two broad, called *Ligamenta Lata*, and by two round, called *Ligamenta Rotunda*. The two broad Ligaments seem to be a Production or Continuation of the *Peritoneum*, they come from the *Ilia*, and are inserted in the sides of the bottom of the Womb; for their largeness and figure, they are commonly compared to the Wings of a Bat. Their Substance is membranous as the *Peritoneum*, but mixed with some fleshy Fibres: besides the Womb they sustain the Spermatick Vessels, the *Ovaria* or Testicles, and the *Tubæ Fallopianæ*.

The two round Ligaments, rise from the fore and lateral Part of the bottom of the Womb, and pass in the Productions

Productions of the *Peritoneum* thorow the rings of the oblique and transverse Muscles of the *Abdomen* to the *Os Pubis*, where they expand like a Goose-foot, and are partly inserted in the *Os Pubis*, and are partly continued or joined to the *Musculus Membranosus* or *Fascia Lata*, on the upper part of the inside of the Thigh, from thence comes the Pain that Women big with Child feel in this place. The Substance of these Ligaments is hard, but covered with a great number of Blood Vessels: they are pretty big at the bottom of the Womb, but they grow smaller and smaller as they approach the *Os Pubis*.

The Spermatick Vessels in Women *Of the Spermatick Vessels* are four, as in Men; they differ only in this, that they are shorter, that the Artery makes several turnings and windings as it goes down, that it divides into two branches, of which the smallest goes to the *Ovarium*, the biggest divides into three more, of which one is bestowed upon the Womb, another upon the *Vagina*, and the third upon the Ligaments of the Womb and *Tubæ Fallopiane*: 'tis the same as to the Vein.

The *Ovaria* are tied about two fingers distance from the bottom of the Womb, by a Ligament which some Anatomists have taken for the *Vasa Defe-* *Of the Situation and Figure of the Ovaria.*

Deferentia. They are fixed to the *Peritonaum* at the *Ilia* by the Spermatick Vessels, and by the Membranes which cover them. They are of an Oval figure, a little flat upon their upper Part, where the Spermatick Vessels enter.

Of their
Membranes
and Substance.

The *Ovaria* or Testicles are about half as big as Mens are; their Surface is unequal and wrinkled in old Women, but smooth and equal in Maids; they are covered with a proper Membrane, which sticks close to their Substance, and with another common from the *Peritonaum*, which covers also the Spermatick Vessels. Their Substance is composed of Fibres and Membranes, which leave little spaces in which there are several small Vesicles, round, full of water, which being boiled, hardens like the white of an Egg; they have each of them two proper Membranes, upon which there are several small twigs of Veins, Arteries, and Nerves. These Vesicles are called Eggs, and they are of a different size, and number, in Women of different Age. Such of them as are impregnant after Copulation, are contained or covered all over with a glandulous Body, which has a small hole in its side, thorow which they are thrust when they fall into the *Tuba Fallopiane*. Besides the Spermatick Vessels,

asels, the *Ovaria* have Nerves from the Intercostrals and Lymphaticks, which discharge themselves into the common Receptacle.

The *Tuba Fallopiana* are situated on the right and left side of the Womb ; they rise from its bottom by a narrow beginning, and they dilate in form of a Trumpet to their Extremities, where they are contracted again into a small Orifice, from whose Circumference they dilate into a pretty broad Membrane, which looks as if it were torn at its edges, therefore called *Morsus Diaboli*. Their Cavity where they open into the Womb, will scarcely admit of a Hog's bristle ; but at its widest part, it will take in the end of one's little finger. These Tubes are tied below the Testicles by a thin large Membrane. Their Substance is composed of two Membranes, the one external, the other internal, a little wrinkled which covers all their Cavity. These Membranes come from the external and internal Membranes of the Womb. The Tubes are about four or five fingers breadth long, they have the same Veins, Arteries, Nerves, and Lymphaticks as the *Ovaria*. These are all the Parts of Generation in Women.

Of the Tubæ Fallopiæ.

So great is the Pleasure in the act of Generation, that it alters the course of the

The Use of these Parts in Generation.

the Blood and Animal Spirits, which then move all the above described Parts, which before lie quiet and at rest. The *Clitoris* is erected, which by its exquisite sense, affords a great deal of Delight, the Glands about the Neck of the Womb, being pressed by the swelling of the neighbouring Parts, pour forth a Liquor to facilitate the Passage of the Yard, and to encrease the Pleasure. The Neck of the Womb contracts and embraces closely the Yard; the Fibres of the Womb contract and opens its Mouth (which at other times is extremely close) for the reception of the spirituous Part of the Seed, and by the extraordinary motion of the Blood and Animal Spirits, the membranous Expansions of the Extremities of the *Tubæ Fallopianæ*, being erected and extended, embrace the *Ovaria* for the carrying the Seed to them. The Seed impregnates the Egg, which from being transparent, becomes Opake some time after; 'tis covered with a thick and glandulous Body which presses it on all sides, and thrusts it out thorow a little hole in its middle; so it falls into the Orifice of the Tubes, which dilate sufficiently for its Passage into the Womb.

Some partly considering the closeness of the Mouth of the Womb, and partly

partly the thickness of the Membranes of the *Ovaria* and *Ova*, do judge it impossible for the Seed to pass this way; therefore they think that it is taken up by the Veins which open in the Cavity of the *Vagina* and *Matrix*, where circulating, it ferments with the menses of Blood, from thence come all those Symptoms which appear in Conception: it enters and impregnates the Egg by the small twigs which are upon its Membranes. This Fermentation swells, the Membranes of the *Tuba*, opens the Cavity of the Womb, and makes every thing ready for the reception of the Egg.

S E C T. XVII.

Of the Generation of the Fœtus, of the Umbilical Vessels, of the Placenta, of the Posture of the Fœtus, and term of Delivery.

THERE are two principal Opinions about Generation; the first is, that all the Parts of the Body were præ-existent in the Egg of the Female, and that Generation is nothing but the quickening and rendring the *Embryo* fit for the Nourishment and due Augmentation which it ought to have. The other is M. *Leuenhoeck's*, who, by his fine Microscopes, does discover a vast number

number of Animalcules in the Male Sperm; he says, that they have all the Shapes of our Body, and that they alone are sufficient for Generation; but Dr. *Garden*, with more reason, thinks that the Female Eggs are for a Nourishment to them; because, that Eggs are frequently found in the *Tuba Fallopiana*. Now the Egg being fallen into the Womb, the Humours which distill from the Extremities of the Vessels of the Womb, penetrating the Tunicles of the Egg, swell and dilate it just as the Sap of the Earth swells Seed that is thrown into the Ground. Or the branches of the Veins and Arteries; whereby the Egg was tied in the *Ovarium* (which may be probably the Umbilical Vessels) being broken, fasten with the Vessels which open in the Cavity of the Womb: then there appears a little Cloud upon the middle of the external Tunicle of the Egg, which Cloud is the beginning of the *Placenta*, and about the same time the Spine of the *Embryo* appears, and a little after the *Cerebrum* and *Cerebellum*, which are like two small Bladders, afterwards the Face begins to form, and the Eyes stand goggling out of the Head; the Heart may be plainly seen beating; and last of all the Extremities appear.

Now

Now the Membranes of the *Foetus* Of the Chorion. are the same with those of the Egg. The first, which is the External, is called *Chorion*; it is pretty thick, smooth on its inside, but rough and unequal on its outside. It receives some branches from the Umbilical Vein and Arteries by which it is tied to the *Placenta*. It covers the *Amnios* or Internal Membrane, and between them there is a Liquor, which is that Liquor which the *Chorion* imbibes first, when the Egg falls into the Womb, this Liquor decreases as the *Foetus* increases: So that towards the last Month, the *Chorion* comes close to the *Amnios*,

Which is the Second and Internal Of the Amnios. Membrane. It covers immediately the *Foetus*. It is whiter, thinner and smoother than the *Chorion*. It contains a clear and pure Liquor, in the middle of which swims the *Foetus*. The first of this Liquor is originally in the Egg (as has been already said) but as soon as the Egg falls into the Womb, 'tis increas'd by the Liquor which the *Chorion* imbibes, which passes also thorow the Pores of the *Amnios*, till the *Placenta* is form'd, which adhering to the bottom of the Womb, intercepts this liquor, and sends it by the Umbilical Vein, some of whose branches terminate in the Glands of the *Amnios*, where this

96 *Of the Generation of the Fœtus, &c.*

this Liquor is separated from the rest of the Blood which is carried back by the branches of the Umbilical Arteries which are spread upon the same Membrane.

Of the Allantoides.

Needham, Graaf, and Bidloo, say, that there is a third Membrane, called Allantoides. In beasts it lies betwixt the Chorion and the Amnios. It is the Receptacle of the Urine of the Fœtus, which is brought from the Bladder into this Membrane by the Urachus, which is one of the Umbilical Vessels; but it is not in a humane Fœtus.

Of the Umbilical Vessels.

Now the Umbilical Vessels are four in number, counting the Urachus, with the two Arteries, and the Umbilical Vein.

The Arteries rise from the Extremity of the Aorta, or the beginning of the Iliacs of the Fœtus, and passing by the sides of the Bladder, they join the Urachus at the Navel; thorough which they pass, then they give some branches to the Amnios and Chorion, and are afterwards divided into an infinite number of branches in the Placenta. The Vein rises by several roots or branches which are spread thorough all the Substance of the Placenta; it pierces the Chorion and Amnios, and passing in at the Navel, it joins the

Vein

Vena Porta, in the Substance of the Liver.

The *Urachus* rises from the bottom of the Bladder, ends in the *Allantoides*, for discharging the Bladder of the Urine, according to some (tho' we cannot perceive any visible Cavity in it.) Others with more reason, think that it ends in the Navel, for the sustaining of the Bladder in its Situation, to hinder that it fall not upon its Orifice, which would necessitate the Urine to run out incessantly.

The Umbilical Vessels come all three out of the Body of the *Fœtus*, wrapt up in one common Tunicle, which makes a rope, upon which there are several knots, which are nothing but the Vessels a little dilated in those places. There are some so foolish as to think, that the number of knots marks the number of Children that the Mother shall have during her life.

The Use of the Umbilical Vessels, is The Use of the Umbilical Vessels. to carry the Maternal Blood by the Veins to the *Fœtus* for its nourishment; that which is unfit for this Use, is carried back by the Arteries to the *Placenta*, whilst the *Fœtus* is still supplied with more by the Vein; so that there is a continual Circulation betwixt the Mother and the *Fœtus*.

Of the Generation of the Fœtus, &c.

The *Placenta* is a glandulous Body fixed to the bottom of the Womb by several small Protuberances or Roots, it grows in proportion as the *Fœtus* grows; it is of a circular Figure: at its biggest, 'tis two fingers thick, and six or seven in Diameter, its Concave side is smooth, its Convex by which it is tied to the Womb, is rough and unequal, there are as many of them as there are *Fœtus*; the Umbilical Vessels terminate in it. The use of the *Placenta* is to separate and prepare, from the Arteries of the Womb, that part of the maternal Blood which is fittest for the nourishment of the *Fœtus*, and to send back, by the Veins of the Womb, the Blood which is brought by the Umbilical Arteries.

Of the Posture
of the Fœtus.

The *Fœtus* is almost of an oval Figure whilst it lies in the Womb, for its Head hangs down with its Chin upon its Breast; its Back is round and turned opposite to its Mothers Back, with its Arms it embraces its Knees, which are drawn up to its Belly, and its Heels are close to its Buttocks, its Head upwards, and its Feet downwards. But about the ninth Month it changes its Posture, the weight of the Head makes it to turn; so its Head falls down, its Feet get up, and its Face turns towards its Mothers Back; but because then it

an irksom, tho' favourable Posture for its Exit, the motion it makes for its relief, give frequent Pains to its Mother, which causes a Contraction of the Womb for the Expulsion of the *Fœtus*. When the Child presents in any other Posture, it should be carefully put back again, and if possible, turn'd to the right way, if that can't be done, it should be brought out by the Feet.

C H A P. III.

Of the Thorax, or Middle Cavity.

S E C T. I.

Of the Dugs.

HAVING already described the Figure, Bounds, and External Parts of the *Thorax*, we come now to examine the Substance and Use of its several Parts; amongst which, the first that presents it self is the Dugs.

The Dugs are like two Semispheres, situated upon the Pectoral Muscles, in the upper Part of the Chest, one on each side; they have each a small Prouberance in their middle, called the
F 2 Nipple,

Nipple, about which there is ordinarily a darkish coloured circle, called *Areola*.

The Substance of the Dugs is composed of a great number of Glands of an oval Figure, of which some are much bigger than others; these Glands lie in a great quantity of Fat, of Veins, Arteries and Nerves, the Vessels make several Plexus's about them, and terminate also in them. They have each an Excretory Duct, which as they approach the Nipple, join and unite together, till at last they form 7, 8, or more small Pipes called *Tubuli Lactiferi*, which have several cross Canals by which they communicate with one another, that if any one of them be stopt, the Milk which was brought to it might not stagnate, but pass thorow by the other Pipes, which all terminate in the Extremity of the Nipple.

The Nipple is made of a fibrous and spongy Substance, thorow which the *Tubuli Lactiferi* pass: It has several Nerves, Veins and Arteries which give it an exquisite sense, and a small erection when it is handled.

The Dugs have Arteries and Veins called *Mammariae*, from the Subclavian Vessels; they have others also from the *Thoracica Superior*, which are spread chiefly in their External Substance

They

Of the Diaphragma, or Midriff. 101

They have Nerves from the Vertebral Pairs, and from the sixth Part of the Brain.

The use of the Dugs is to separate the Milk for the Nourishment of the *Fœtus*. The Arteries which terminate in the Glands, which compose the Substance of the Dugs, bring the Blood impregnate with a Chyle which has received its last Perfection by its Circulation thorow the Lungs; this Chyle being separated by the Glands of the Dugs, runs thorow the *Tubuli Lactiferi* upon the Suction of the Child.

The Dugs in Men are very small, they are chiefly for an Ornament. I have seen some Men who have had Milk in them.

S E C T. II.

Of the Diaphragma, or Midriff.

Under the Dugs lie the Muscles and Bones which compose the forepart of the Thorax; these are described in their proper Places; having therefore put them up, and having laid the Cavity of the Thorax open, the *Diaphragma*, *Pleura*, *Mediastinum*, Heart, and Lungs appear.

The *Diaphragma* is composed of two Muscles, which divide the middle and lower Cavity. The First and Superior

Of the two Muscles which compose the Midriff.

102 *Of the Diaphragma, or Midriff.*

riour Muscle is Circular, where it be-
ginneth from the *Sternum*, and the last
Ribs on each side, and ends in a Ten-
don or *Aponeurosis*, which hath al-
ways been taken for the nervous Part
of the Midriff. The Second and Infe-
riour Muscle comes from the *Vertebra*
of the Loins, by two Productions, of
which that on the right side comes
from the first, second, and third *Ver-
tebra* of the Loins; that on the left
side is somewhat shorter, and both these
Productions join and make the lower
Part of the Midriff; which joins its
Tendon with the Tendon of the other,
so as that they make but one Mem-
brane, or rather Partition.

The Midriff is covered with a Mem-
brane, from the *Pleura*, on its upper
side, and by the *Peritoneum* on its lower
side; it is pierced in its middle for
the Passage of the *Vena Cava*; in its
lower Part, for the *Oesophagus*; and
the Nerves which go to the upper Ori-
fice of the Stomach, and betwixt the
Productions of the Inferiour Muscle
passes the *Aorta*, the Thoracick Duct,
and the *Vena Azygos*.

Of its Vessels.

The Midriff receives Arteries and
Veins called *Phrenica* from the *Cava*
and *Aorta*; and sometimes on its lower
Part, two branches, from the *Vena*
Adiposa, and two Arteries, from the
Lumbares.

Of the Diaphragma, or Midriff. 103

Lumbares. It has two Nerves which come from the third *Vertebra* of the Neck, which pass thorow the Cavity of the *Thorax*, and are dispersed in the Muscles of the Midriff. Some say, that these Diaphragmatick Nerves are the Organ of Laughter, of Weeping, of Sneezing, and of Singing, because of the Connexion they have with the Nerves, which go to the Muscles, which perform these Motions.

The Midriff, in its natural Situation, *Of its Use.* is Convex on the upper side towards the Breast, and Concave on its lower side towards the Belly: therefore when its Fibres swell and contract, it must become plain on each side, and consequently the Cavity of the Breast is enlarged, to give liberty to the Lungs to receive the Air in the Inspiration; and the Stomach and Intestines are pressed for the distribution of the Chyle; but it diminishes the Cavity of the Breast, when it resumes its natural Situation, and presses the Lungs for the Expulsion of the Air in Expiration.

S E C T. III.

*Of the Pleura, Mediastinum, and
Thymus.**Of the Pleura.*

TH E *Pleura* is a double Membrane, which covers all the Cavity of the *Thorax*, it arises from the *Vertebra* of the Back, ascends on each side upon the Ribs, to the middle of the *Sternum*. It is fixed to the *Periostium* of the Ribs to the internal intercostal Muscles : and it covers the Midriff. Its side towards the Cavity is smooth and equal, but that which is fixed to the Ribs is rough. The Vessels which run betwixt its Duplication, are Veins from *Vena Azygos* and upper intercostal Vein, Arteries from the Inferior and Superior intercostal Arteries, and Nerves from the twelfth Pair of the Back from the intercostal Pair, and from the eighth Pair.

*Of the Media-
stinum.*

The *Mediastinum* is a double Membrane, formed by the continuation of the *Pleura* ; it comes from the *Sternum*, and goes straight down, thorow the middle of the *Thorax* to the *Vertebra*, dividing the Cavity in two. It contains, in its doubling, the Heart, in its *Pericardium*, the *Vena Cava*, the *Oesophagus*, and the Stomachick Nerves. The Membranes of the *Mediastinum* are

are finer and thinner than the *Pleura*, and they have a little Fat. The *Mediastinum* receives branches of Veins and Arteries from the Mammillary and Diaphragmatick, and one Proper, called *Mediastina*, its Nerves come from the Stomachick; it has also some Lymphaticks which open in the Thoracick Duct. The *Mediastinum* divides the *Thorax* in two Parts, to the end that one Lobe of the Lungs may officiate, if the other be hindered by a Wound on the other side of the *Thorax*; it fixes the Heart in its *Pericardium*, and preserves them from external Injuries. Sometimes there is a matter contained betwixt its Membranes, immediately under the *Sternum*, which may occasion the Trepaning of this place.

The *Thymus* passes for a Conglomerate Gland, a little softer than the *Pancreas*, situated in the upper Part of the *Thorax* under the *Clavicula*, where the *Cava* and *Aorta* divide into the Subclavian branches. This Gland is big in Infants, but as they grow in Age, it grows less. It receives Veins and Arteries from the Jugulars, Nerves from the *Par Vagus*, and Lymphatick Vessels which discharge themselves in the Subclavian Vein.

The use that is commonly given to the *Thymus*, is to be a little Cushion,

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to support the Thoracick Duct, and to strengthen the *Cava* and *Aorta*, at their Divisions in the Subclavian Vessels, to defend them against the hardness of the *Vertebra*: But 'tis probable that its principal use is to filtrate or separate some Liquor which is not yet known.

S E C T. IV.

Of the Pericardium, Heart, and its Parts.

Of the Pericardium.

THE *Pericardium* is a thick Membrane of a Conick Figure, it resembles a Purse, and contains the Heart in its Cavity. Its Basis is pierced in five places, for the Passage of the Vessels, which enter and come out of the heart; it is fixed to the *Mediastinum*, and to the Midriff. It receives its Vessels from the Axillaries and *Phrenica*, Nerves from the recurrent and Diaphragmatick. It has Lymphaticks, which discharge themselves in the Thoracick Duct. It defends the Heart from external Injuries.

Of the Water contained in the Pericardium.

In the bottom of the *Pericardium* there is a clear and sweet tasted Water, but in some, tingured a little with Blood. It is found in abundance in the *Pericardium* of Women and Old Men, but there is little of it in those that are Hectick and Pleuritick. When it is in too great quantity, it causes a Palpi-

Palpitation of the Heart, and sometimes Death.

Authors do not agree about the rise of this Water. Some say, that it comes from the Extremities of the Arteries; others, that it comes thorow the Substance of the Heart, but it's more probable that it is filtrated thorow the Glands, which are at the basis of the heart, and that it may not abound too much, nor putrify by standing too long, it is taken up by some small Glands which are in the Membrane of the *Pericardium*, and from them carried by the Lymphaticks into the Thoracick Duct.

The Heart is situated in the middle of the *Thorax*, between the two Lobes of the Lungs, it is of a Conick Figure. Its basis is the upper end, and its *Apex* or Point is the lower end, which is turned a little to the left side; therefore its motion is best felt there. It is tied to the *Mediastinum*, to the *Pericardium*; and sustained by the great Vessels which bring and carry back the Blood. It is covered by a Membrane, which is the proper Membrane of the Muscles; its basis is always surrounded with Fat, in which there are some small Glands. It has two Veins, which come from the *Cava*, immediately before it opens in the Heart, and they are accompanied with two Arteries from the *Aorta*, which

Of the Situation, Figure and Connexions of the Heart.

Of its Vessels.

which run thorow all the Substance of the Heart; they are called the *Coronal Vessels*. The Veins on the right side communicate, at their Extremity, with the Veins of the left. In like manner do the Arteries of each side communicate with one another; and it is the same almost in all the Parts of the Body. The Heart receives a multitude of small Nerves from the eighth Pair, particularly they creep in great numbers about the *Aorta*, and on the left Ventricle. It has also some Lymphatics, which discharge themselves in the Thoracick Duct.

Of the Auricle.

At the basis of the Heart, there are two *Auricula* or little Ears, one on the right, the other on the left side. In the right Ear opens the *Vena Cava*, in the left the *Vena Pulmonaria*. The first discharges the Blood that it receives from the *Cava* into the right Ventricle; and the second thrusts the Blood that comes from the *Vena Pulmonaria* into the left Ventricle. Their Figure is like the triangle *Amblygonium*, the left is less, but thicker than the right. Their Substance is composed of two Orders of muscular Fibres, which terminate in the tendon in the basis of the Heart; and at the right Ear, there is a circle like to a tendon, where the *Cava* ends. Their external Surface is smooth;

smooth; their internal is unequal, full of small fleshy Pillars, which send out small Fibres that cross and go thwart one another: and betwixt these Pillars there are as many furrows, which are more in the left, than in the right Ear; they receive Nerves from the branches of the eighth Pair. They have the same motions of *Systole* and *Diastole* as the Heart, which we shall explain afterwards. Their Use is to receive the Blood, which is brought by the Veins, and by them to be thrust into the Ventricles of the Heart. *Their Use.*

In the Heart, there are two Cavities or Ventricles, which answer to the two Ears, one on each side; the sides of these Cavities are very unequal, full of Fibres and little fleshy Productions, long and round, of a different Figure and bigness, called *Columnæ* or Pillars. Betwixt these Fibres, there are several furrows, in the sides of the Ventricles, especially in the left Ventricle, they are deeper and larger; they contribute much to the close contraction of the Ventricles. And because the side of the right Ventricle is much thinner than the left, therefore there are often two or three fleshy Fibres, which come from the middle Partition to its opposite side, to hinder it from dilating too much. *Of the Ventricles of the Heart.*

The right Ventricle seemeth wider
than

than the left, which is longer and narrower than the right, and its sides stronger and thicker. The two Ventricles are separated by the *Septum Medium*, which is properly the inside of the left Ventricle, being its Fibres are continued with the Fibres of the opposite side of the same Ventricle. The Vessels which enter and come out of the Heart, are the *Vena Cava*, the *Arteria* and *Vena Pulmonaria*, and the *Aorta* or *Arteria Magna*.

*Of the right
Ventricle, and
of its Valves.*

The right Ventricle receives the Blood from the *Vena Cava*, thorow the right Ear, and at the mouth of the Ventricle there are placed three Valves, made of a thin Membrane; they are of a triangular Figure, and are called *Tricuspides*; their bases are fixed to the mouth of the Ventricle, and their Points tied by small Fibres to the fleshy Productions; so that when the Heart contracts, its Point approaches its basis, the fleshy Productions move upwards; therefore the Fibres of these Valves are relaxed, and the Valves lifted up by the Blood, which gets underneath them, because the furrows and fleshy Productions keeping the Valves at a little distance from the sides of the Ventricle, give way to the Blood to pass under them, and so to thrust up the Valves, which shut so closely the entry into the Ventricle,

tricle, that the Blood cannot return the way it came in. But when the Ventricle is dilated, the Fibres are pulled down, and the Passage made open for the Blood to enter.

When the Heart contracts, the Valves being lifted up, the Blood in the right Ventricle finds an open Passage into the *Arteria Pulmonaria*, which rises immediately out of the right Ventricle; its Mouth is less than the *Cava*, it has three Valves called *Segmoidales* or *Semi-lunares*, because they resemble a Half-Moon or Segment of a circle; their Substance is membranous. When they separate, they give passage to the Blood, from the Ventricle into the Artery; but they shut the Passage, and are thrust together, by the Blood, if it endeavours to return.

*Of the Valves
of the Arteria
Pulmonaria.*

The *Vena Pulmonaria* discharges it self thorow the left Ear into the Ventricle of the same side. At the Orifice of this Ventricle there are two Valves called *Mitralles*, because when they are joined together, they resemble a Mitre; they are broader than the other Valves; they are situated, and have the same use as the *Tricuspides* in the right Ventricle.

*Of the Valves
of the left
Ventricle.*

The *Aorta* or great Artery, rises immediately out of the left Ventricle; it has three Valves, which have the same Use and Figure as the *Semi-lunares* in the *Arteria Pulmonaria*.

*Of the Valves
of the Aorta.*

The

Of the Sub-
stance of the
Heart, and of
the order of
its Fibres.

The Heart is a compound Muscle; its Substance is made of Fibres of the same Nature as those of other Muscles; there are several Orders of them, which have different Directions, and all their Tendons are in the basis of the Heart. The First, or External Order is of Fibres, which surround the whole Heart; they go in an Oblique or Spiral Line from the left to the right, except on the Surface of the right side, some of its finest Fibres go in a straight Line from the basis to the Point. The Second or next order surrounds also the whole heart, they have a contrary Direction, which is from the right to the left in an Oblique or Spiral Line. The next Orders are only proper to the left Ventricle. The first, which is on the external side of the Ventricle, goes in an Oblique Line from the left to the right. The second Order is on the inside, or that which makes the *Septum Medium*, or Partition Wall of the Ventricles; they go in an Oblique Line from the right to the left, and they are continued with the foregoing Fibres at the Point of the Heart.

All these Orders of Fibres come together as to one common Centre at the Point of the Heart; But,

Obs. That all the Fibres of the same Order, do not always go from the basis to.

to the Point ; for some after they have gone about half way obliquely from the one side, turn up obliquely, and are inserted in the basis on the other side. Neither do all the Fibres in the same order keep together, for some intermix with the Fibres of the next Order ; so in separating these Orders many Fibres are broken. Some of the Fibres in the internal Orders, proper to the left Ventricle, terminate in the fleshy Productions of the same Ventricle. The Bone which is found in the basis of the Hearts of several Beasts, is nothing but the tendons of the Fibres of the Heart ossified : it is sometimes found in Men.

This Muscle has two Motions, which they call *Systole* and *Diastole*. The *Systole* is when the Fibres of the Heart contract, its Point approaches its basis, the Heart becomes short ; its sides swell, and its Cavities are strongly pressed on all sides. The *Diastole* is when this Muscle ceaseth to act ; its Fibres are lengthened ; its Point recedes from its basis ; its sides fall, and its Cavities become large and wide.

Of the Systole and Diastole of the Heart.

Having described the Heart and its Parts, let us now consider the Circulation of the Blood, which is performed by means of this Muscle, the *Vena Cava Ascendens* and *Descendens* unite in one

Of the Circulation of the Blood thorow the Heart.

one, and open into the right Ear; where they unite, there is a little Protuberance made by their Coats on the inside of the Canal like an *Isthmus*, which directs the Blood both of the one and the other into the Ear, and so hinders them from rushing upon one another. The right Ear in its *Diastole* receives the Blood from the *Vena Cava*, which by its *Systole* is thrust into the right Ventricle; (for the tendinous Circle which is at the Mouth of the *Cava* contracts, and hinders the Blood to return into it,) which at the same time is in its *Diastole*; in the *Systole* of the right Ventricle the Blood is thrust into the *Arteria Pulmonaria*, (for it cannot return into the Ear, because of the *Valvula Tricuspides*) which communicates with the *Vena Pulmonaria*, which carries back the Blood into the left Ear, which in its *Systole*, thrusts the Blood into the left Ventricle which is then in its *Diastole*. In the *Systole* of this Ventricle, the Blood is thrust into the *Aorta*; (for it cannot return into the Ear, because of the *Valvula Mitrales*) which carries it thorow all the Body. Now the *Aorta*, when it comes out of the Heart, ascends a little upwards, and then turns downwards to form the descending Trunk, because the Blood might offend the Brain, if it

ran with that impetuosity with which it's thrown out of the Heart; and from the upper side of this turning, the Cervical and Axillary Vessels do arise: by this artifice the Blood collides against the sides of the *Aorta*; its force is broken; part of it is taken in by the Mouths of the ascending branches, but its greatest part is directed downwards.

Let us now consider which way the Blood circulates in the *Fœtus*; for this you must observe, that in the right Ear, on the lower side of the Protuberance of the *Cava*, just opposite to the Mouth of the *Cava Descendens*, there is a hole called the *Foramen Ovale*, which opens into the *Vena Pulmonaria*; this hole has a Valve, which suffers the Blood to enter the Vein, but hinders it to come back again. There is likewise a Passage or Canal called *Ductus Bottali*, which comes from the Trunk of the *Arteria Pulmonaria*, and goes to the Trunk of the *Aorta*.

Now the Blood which comes from the *Placenta*, by the Umbilical Vein into the *Porta*, is sent into the *Cava*, by a Canal, which goes straight from the Trunk of the *Porta*, to the Trunk of the *Cava* in the Liver. This ascends the *Vena Cava*, and is directly thrown thorow the *Foramen Ovale*, into the *Vena*

Of the Circulation of the Blood in the Fœtus.

116 *Of the Pericardium, Heart, &c.*

Vena Pulmonaria, which carries it into the left Ventricle, which throws it into the *Aorta*, to be distributed thorow all the Body. But the Blood which comes down the *Vena Cava ascendens*, is diverted by the *Isthmus* of the *Cava*, from the *Foramen Ovale*, and falls into the right Ventricle, which thrusts it into the *Arteria Pulmonaria*, from whence it's immediately carried by the *Ductus Bottali* into the *Aorta*, to be mixt with the rest of the Blood. By this you see, that the Blood which comes from the *Vena Cava descendens*, passes only thorow the left Ventricle, whilst the Blood which comes from the *Cava ascendens*, passes only thorow the right Ventricle.

Thus having shewed what way and by what means the Blood circulates thorow the Heart; let us now reflect a little upon the quickness of its motion. Each Ventricle will at least contain an Ounce of Blood, and therefore we may safely suppose that the Heart throws into the *Aorta*, an Ounce of Blood every time it contracts. The Heart contracts 4000 times in one Hour, or sometimes more and sometimes less, according to the different Temperaments, Sexes and Ages: from which it follows, that there passes thorow the Heart every hour 4000 Ounces,
or

For 350 Pound of Blood. Now the whole mass of Blood is but about 25 Pound; so that a quantity of Blood equal to the whole mass of Blood, passes thorough the Heart 14 times in one hour, which is about once every 4 minutes. I say, a quantity which is equal to the whole mass of Blood, and not the whole mass it self; for it is not to be supposed that the Blood which goes to the Extremities can return to the Heart as soon as the Blood which goes only to the Kidneys or Liver.

The Velocity and quantity of Blood, together with the time it takes to run in different Blood Vessels, differ according to the different lengths and orifices of the Vessels, according to the greater and lesser Compression the Vessels receive in the different Parts thorough which they run, according to different quantity of Secretions from the Vessels in the several Parts of the Body, according as the Vessels have more or less turnings and windings, and according as they divide into more or fewer branches. These things determinate the Velocity, Time, and Quantity of blood in the several Vessels of the body.

In the Blood there is much volatile salt and Spirits, some Phlegm and sulphur, a little Earth, but little or
no

no fixt Salt. Alkali's dissolve it, and Acids coagulate it.

S E C T. V.

Of the Lungs.

Of the Figure
of the Lungs.

THE Lungs are in the middle of the Cavity of the *Thorax*; they are divided into two Lobes by the *Mediastinum*; and the left is ordinarily subdivided into two more. The Figure of both Lobes together resemble a Cows foot, being a little concave betwixt the two Lobes, where they embrace the Heart, and behind, where they lie upon the *Vertebra*; but before, where they touch the *Sternum*, and Ribs, they are Convex. The colour of the Lungs in a *Fœtus*, is of a pale red, but after that the Air has once entered them, they lose their red, and remain always pale; yet in Adults they are variegated with the one and the other. They are tied to the *Sternum* by the *Mediastinum* before, to the *Vertebra* by the *Pleura* behind, where it rises from the *Vertebra*, to the Heart by the *Vena* and *Arteria Pulmonaria*, and sometimes to the *Pleura*, where it covers the Ribs particularly in the left side, and especially after a Pleurisie.

Of their Colour and Connexion.

Of the Membranes of the Lungs.

The Lobes of the Lungs are covered with a double Membrane; the Exter-

nal

Of the Lungs.

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External is smooth, fine, but close. The Internal is rough and unequal, formed by the Extremities of the Vessels and Membrane which tie the Vesicles together. It resembles the side of a Honey-Comb. Each Lobe is subdivided into an infinite number of little Lobes, disposed like so many Grapes, upon the Sides and Extremities of the branches of the *Bronchie*, covered each with their proper Membrane, and tied together by a number of Membranes, which fill up the Spaces that these Lobes leave between one another. Each little Lobe contains an infinite number of small and little Orbicular Vesicles, which leave small Interstices between them, which are full of small Membranes, like those which tie the Lobes together. Each Vesicle receives a twig from the branch of the *Bronchie* that enters the Lobe in which they are contained: This twig opens in their Cavity, which is divided into little Cells which communicate with one another, and a twig from the Vein, Nerve, and Artery which are spread upon the Membranes of the Vesicle: each Vesicle communicates with one another.

Of the Structure of the Lungs.

Now the Vessels which enter the Lungs, are the *Trachea* or *Aspera Arteria* which comes from the *Larynx*, the *Arteria Pulmonaria*, which comes from the

Of the Vessels of the Lungs.

the right Ventricle, and *Vena Pulmonaria* which comes from the left Ear of the Heart ; each of these divides into two branches, for the two great Lobes of the Lungs, which being accompanied with the branches, from the eighth Pair of Nerves, they divide into as many branches as there are little Lobes in the Lungs. Where-ever there is a branch of the *Trachea* there, there is a branch of the Nerve, Vein, and Artery ; and the *Trachea* is always in the middle. The branches of the *Trachea Arteria*, which are ordinarily called *Bronchiæ*, open in the Cavity of the Vesicles, and the Nerves, Veins, and Arteries, form *Plexus's* upon the Membranes of the Vesicles ; the Arteries open into the Veins by an *Anastomosis*. Besides these, the Lungs have Lymphaticks, which discharge themselves into the Thoracick Duct, accompanying the Vein, and they are chiefly to be seen in the External Part of the Lungs. There is also a Vein which comes from the *Cava* that *Sommichellius* calls *Pneumonica*, and an Artery that *M. Ruysch* calls *Arteria Bronchialis*, which comes from the *Aorta* : The Artery brings the Blood for the Nourishment of the Substance of the Lungs, and the Vein carries back what is superfluous.

This

Of the Lungs.

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This is the passage of the Vessels thorow the Lungs ; but because the *Trachea Arteria* has a particular Structure, it demands a particular Examination. It is a Canal situated in the forepart of the Neck, before the *Oesophagus* ; it descends from the *Larynx* to the fourth *Vertebra* of the Back, where it divides, and enters the Lungs, and its branches are afterwards called *Bronchie*. This Canal is made of Annular Cartilages, which are at small and equal distances from one another. These Cartilages the nearer they are to the *Larynx* the bigger they are and the further they are from it, the smaller they are ; and those of the *Bronchie* are so close to one another, that, in expiration, the second enters within the first, and the third within the second, and so the following always enters the preceeding. Betwixt the *Larynx* and the Lungs these Cartilages make not compleat rings, but their hind part, which is contiguous to the *Oesophagus* is membranous, that they may the better contract and dilate, and give way to the Aliments as they go down the *Oesophagus* : but the Cartilages in the *Bronchie* are compleatly Annular ; only the Extremities of the *Bronchie*, a little before they open into the Vesicles, have no Cartilages,

G

but

Of the Trachea Arteria.

Of its Cartilages.

but instead of them they have small circular Ligaments, which contract and dilate for the reception and expulsion of the Air.

Of its Mem-
branes.

These Cartilages are tied together by two Membranes, the one external, and the other internal. The external is composed of circular Fibres; it covers the whole *Trachea* externally. The internal is of an exquisite sense, it covers the Cartilages internally. It is composed of three distinct Membranes. The First is woven of two Orders of Fibres. Those of the first Order are Longitudinal, for the shortening the *Trachea*; they make the Cartilages approach and enter one another. The other Order is of circular Fibres, for the contracting the Cartilages. When these two Orders of Fibres act, they help, with the external Membrane, in Expiration, in Coughing, and in the Excretion of any tickling humour. The second Membrane is altogether glandulous; and the Excretory Vessels of these Glands open in the Cavity of the *Trachea*; they separate a Liquor for the moistening the Cavity, and for defending it from the Acrimony of the Air. The third and last is a Net of Veins, Nerves, and Arteries. The Veins come from the *Vena Cava*; the Nerves from the *Recurrent*, and the Arteries from the *Carotides*. Having

Of the Lungs.

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Of the use of
the Lungs.

Having thus considered the Structure of the Lungs, 'tis evident that the Air enters by the *Trachea* into the Vesicles, and so swells and dilates the Substance of the Lungs in Inspiration; but in Expiration these Vesicles contract, and thrust out the Air, which carries a great deal of excrementitious Vapours from the Blood along with it, by the Elasticity of their Fibres, by the help of the Nerves, and by the pressure of the surrounding Bodies employed in respiration. It is also evident, that the Blood is carried from the Heart by the *Arteria Pulmonaria*, thorow all the Substance of the Lungs, and that the same Blood is taken up by the *Vena Pulmonaria*, and carried back again to the Heart. And we are sure, that whilst the Blood passes thorow the Lungs, that it receives some alteration; for the Blood in the *Arteria Pulmonaria* is of a dark colour, as venal Blood; but that which is in the Vein is of a florid red, as Arterial Blood; yet how this Alteration is made is not determined by Anatomists.

Some considering that the Surface of venal Blood, drawn in a Pellet and exposed to the Air, turns to the colour of Arterial Blood; do think that the minute Particles of the Air which we breathe, passes thorow the Tunicles of

the Vessels, and mixes with the Blood, and causes this Alteration, which they say is necessary for the recruiting of the Animal Spirits, and for the entertaining the natural heat of the Blood, by fermenting with the Sulphureous Parts of the Aliments.

Others explain this Alteration only by the beating and agitation of the Air upon the bloody Vessels of the Lungs, which indeed is sufficient to cause this Alteration; and the necessity of this beating appears by an Experiment, which is this; take a little new drawn Blood, look to it immediately thorow a Microscope, you shall see a number of small, red globules, swimming in a thin and clear Liquor; and the longer you look, the more of these Globules join in one, and the bigger they grow, till at last they all come into one, and the Liquor is separated by its self, and then the Blood is coagulated.

Thus the red Globules of the Blood in the Veins as they return from the Extremities, grow bigger and bigger for the want of being agitated: And if they were not separated and broken into many smaller Particles, they would soon cause a stagnation in the Capillary Vessels. So the beating of the Air in Inspiration and Expiration is necessary

necessary for the attenuating, subtilizing, and intimately mixing the Chyle, *Lympha*, and other Parts of the Blood.

S E C T. VI.

Of the Larynx.

THE upper Part of the *Trachea Ar-* Its Situation.
teria, is called the *Larynx*. It is almost of a circular Figure, lying below the root of the Tongue before the *Pharynx*. It is composed of five Cartilages, which sometimes in old Men become as hard as Bones.

The first is the *Epiglottis* or *Scuti-* Of the Carti-
formis, because of its Figure. It makes lago Scuti-
 that Protuberance in the forepart of formis.
 the *Larynx* called *Pomum Adami*. It has four Corners. It is about an inch broad, but not so long. It's Concave within, and Convex without. It is divided in the middle by a Line from its upper to its lower Part; its four Angles have each a small Production; the two upper, which are longer, are tied to the Horns of the *Os Hyoides*, and the two lower to the second Cartilage, which is called *Kerckoides*, or *An-* Of the Annu-
ularis, because it resembles a ring: It's laris.
 very large and thick behind, which Part is like the Stone of a Ring; it's situated below the other Cartilages of the *Larynx*. They stand upon it as

upon a basis, and by it they are tied to the *Trachea*.

Of the *Arytæ-*
noides.

The Third and Fourth are called *Ἀρυτανοειδῆς*---they reach from the middle of the Concave side of the *Thyroides* to the upper, and back part of the *Annularis*; and they make that chink or *Rimula*, which is the Mouth of the *Larynx*, called *Glottis*. Betwixt those and the sides of the *Thyroides* there are two small Cavities on each side, formed by the Muscles and Membranes which join them together; in which, if a little drink or bread fall, as sometimes happens, when one laughs or speaks in eating or drinking, it causes a violent Cough, and a great tickling.

Of the *Epi-*
glottis,

The Fifth and last Cartilage, is the *Epiglottis*; it's of a softer Substance than the others; it resembles a little Tongue; it is tied by its basis to the upper and middle Part of the Concave side of the *Thyroides*; its use is to cover the *Glottis* in eating and drinking; for the Aliments by their weight press it close down upon the *Glottis*, and they pass over, without entering the *Larynx*, into the *Oesophagus*: but when the Aliments are past, the *Epiglottis*, by its natural resort, which is common to all Cartilages, lifts up again, and gives way to the Air for the

Respi-

Respiration. When we Speak or Laugh, the *Glottis* must necessarily be open for the Passage of the Air; therefore it is not convenient to speak whilst we are Eating or Drinking.

The *Larynx* has two Pair of com- Of the Muscles of the Larynx.
mon Muscles, and four Pair proper.

The First of the Common Muscles Sternothyroidæus. is the *Sternothyroidæus*; it arises from the upper Part of the inside of the *Sternum*, and ascending on the sides of the *Trachea Arteria*, it is inserted to the lower Part of the sides of the *Cartilago Scutiformis*: when these Muscles act, they pull this Cartilage downwards.

The Second is the *Hyothyroidæus*; it Hyothyroidæus. arises from the lower Part of the *Os Hyoides*, and descending is inserted to the lower Part of the *Scutiformis* near the former. They pull up the *Larynx*.

The First of the proper Muscles is Cricothyroidæus. the *Cricothyroidæus*; it ariseth from the forepart of the Cartilage *Cricoides*, and running under the *Thyroides*, it is inserted into the inside of that Cartilage.

The Second is the *Cricoarytenoidæus*; Cricoarytenoidæus. it ariseth from the lateral Part of the *Cricoides*, and ascending is inserted to the lateral Part of the *Arytenoides*; this dilates the *Arytenoides*. I see no reason

for dividing this Muscle in two, as Mr. Cooper has done.

Thyro-Ary-
tenoidæus.

The Third is the *Thyro-Arytenoidæus*; it ariseth from the internal and Concave side of the *Scutiformis*, and is inserted to the foreparts of the *Arytenoides*; it contracts the *Rimula*.

Arytenoi-
dæus.

The Fourth Muscle is the *Arytenoidæus*; it runneth upon the upper Part of the Cartilage *Arytenoides*, and with its fellow, forms a Sphincter for contracting of the *Rimula*.

A true Squinzie which is caused by the Inflammation of these Muscles, is Mortal; because they shut exactly the chink of the *Larynx*; therefore *Bronchotomy* is absolutely necessary in this case, but it is rarely, tho' it may be safely used.

of the Vessels
of the Larynx. The *Larynx* receives Veins from the *Jugulars*, Arteries from the *Carotides*, and Nerves from the *Recurrent*.

of the Glan-
dulæ Thy-
roidææ.

On the lower Part of the *Larynx*, upon the sides of the Annular Cartilage, and of the first ring of the *Trachea*, there are two Glands called *Thyroidææ*; they are big and spongy, of the figure of a Pear, their colour is red; their Substance solid and viscous; they have Veins, Nerves and Arteries as the *Larynx*; they have also some Lymphaticks.

Their

Their Use is to separate a Serosity from the blood ; this Serosity is deprived of its Acrimony by the Fat which is about the Glands, and it is afterwards sent thorow their Excretory Vessels into the Cavity of the *Larynx*, for the moistening it, and for facilitating the Motion of the Cartilages.

CHAP. IV.

Of the Upper Cavity, or Head.

SECTION I.

Of the Frontal and Occipital Muscles ; and of the Pericranium.

THE Head is situated in the upper Part of the Body, not only for the conveniency of the Senses, but also that the Brain may the more easily send the Animal Spirits to all the Parts of the Body.

Its Natural Figure is round, but a little flat upon its Sides ; round, that it might contain the greater quantity of Brains ; and flat upon its Sides, that the bounds of the Sight may be the larger, or rather that the Ears might not be too much exposed to danger.

We have divided the external Parts of the Head into two, the Face and the hairy Scalp; we shall now divide it into the Containing and the Contained Parts. The Containing Parts are the Skin with the Hair upon it, the *Pericranium*, the Skull, and the two *Meninges*. Of the Skin and Hair we have already spoken; of the Skull we shall speak in its proper place.

Anatomists do generally say, that the Skull is covered both with a *Pericranium* and a *Periosteum*, but they have taken the *Aponeurosis* of the Occipital and Frontal Muscles for one of them. These Muscles lie immediately under the Skin. The first two are called *Frontales*. Their fleshy Fibres are inserted into the Eye-brows, from thence they go straight up the *Os frontis*, and are continued by a long and large *Aponeurosis* to that of the *Occipitales*; they adhere closely to the Skin of the Forehead, which they pull upwards. The other two Muscles, which are called *Occipitales*, have their fleshy Fibres fixed to the Skin of the Hind-head, which they also pull upwards: They are short, broad, and thin, and they end in a large *Aponeurosis*, which joins that of the Frontals, and both together cover the whole Skull.

There-

Of the Dura and Pia Mater.

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Therefore the *Periosteum* or *Peri-*
cranium, is a very thin and nervous Of the Peri-
Membrane, of an exquisite sense, which cranium.
covers immediately not only the *Cra-*
nium, but all the Bones of the Body
except the Teeth, and Bones of the
Ear. It is tied to the *Dura Mater*,
by some Fibres which pass thorow the
Sutures of the Skull. It receives Veins
from the external Jugulars, Arteries
from the Carotides, Nerves from the
fifth Pair of the Brain, and from the
second of the Neck.

S E C T. II.

Of the Dura and Pia Mater.

THE Membranes or *Meninges*, which
are within the *Cranium* are two,
the *Dura Mater*, and the *Pia Mater*;
so called, because they are supposed to
be the Origination of all the Mem-
branes of the Body.

The *Dura Mater* is a strong and Of the Dura
thick Membrane, which covers all the Mater.
Cavity of the *Cranium*, it contains the
whole Brain somewhat loosely, that the
Vessels which run between its Dupli-
cature, and upon the Surface of the
Brain, be not too much press'd by the
Cranium; it sticks very close to the
basis of the *Cranium*, and to its Su-
tures by the Fibres and Vessels it sends
to

to the *Pericranium*; it is fastened to the *Pia Mater*, and to the Brain, by the Vessels which pass from the one to the other. It gives a Coat or Covering to all the Nerves which rise from the Brain, to the *Spinalis Medulla*, and to all the Nerves which rise from it. Its Surface is rough towards the *Cranium*, but smooth towards the Brain. It is a double Membrane woven of strong Fibres, which may be plainly seen on its inside, but very hardly on its outside next the *Cranium*.

Of its Processes.

The *Dura Mater* hath three Processes made by the doubling of its inner Membrane. The First rises by a narrow beginning from the *Crista Galli* to which it is fastened, and as it approaches the hindhead it grows broader and broader, till it terminate where the Longitudinal *Sinus* ends. It divides the *Cerebrum* into two Hemispheres as deep as the *Corpus Callosum*. It resembles a Sickle, therefore it is called *Falx*. The Second separates the *Cerebrum* from the *Cerebellum* down to the *Medulla Oblongata*, that the weight of the *Cerebrum* may not offend the *Cerebellum* which lies under it. This Process is very strong and thick, and in ravenous Beasts 'tis for the most part bony, because of the violent motion of their Brain. The Third is the smallest; it separates

separates the external Substance of the hindpart of the *Cerebellum* into two Protuberances ; and upon it Mons. *Du Verney's* fifth *Sinus* runs.

In the *Dura Mater* there are several *Sinus's* or Channels, which run between its external and internal Membrane ; of these there are four principal ones, which are commonly described.

Of the Sinus's of the Dura Mater.

The First is the *Sinus Longitudinalis*, it rises from the blind hole in the upper Part of the *Crista Galli* ; it runs along the upper Part of the *Falx*, and ends where it ends ; it lies exactly under the *Sutura Sagittalis*. Into this *Sinus*, the Veins of the Brain, and some of the proper Veins of the *Dura Mater* bring back the Blood which they receive from the Arteries. Of these Veins, some running obliquely, from the forepart of the Brain backwards, and others contrary, from the hindpart forward, creep a little space between the Duplication of the Membrane, as the Ureters do upon the Bladder, and so they open in the *Sinus*. In this *Sinus* there are several small Cells and round Ligaments, which go from one side of the Cavity to the other. These by their Elasticity retard or further the Motion of the Blood.

First of the Longitudinalis.

The

Laterales.

The Second and Third *Sinus's*, which this *Sinus* pours into, are the *Laterales*; they rise from the end of the first into which they open, and going down upon the sides of the Occipital Bone, in a crooked way, they pass thorow the same hole, with the eighth Pair of Nerves, and discharge themselves into the internal Jugulars: into these *Sinus's* some Veins and the other *Sinus's* discharge themselves.

Of the Fourth Sinus.

The Fourth *Sinus* runs upon the broad Extremity of the *Falx*, and opens where the Lateral *Sinus's* join the Longitudinal. This meeting of the four *Sinus's* is called *Torcular*. It receives the Blood at its other Extremity, from a Vein of the *Plexus Choroides*.

Of the Sinus Superiores.

Besides these, there are Six more, which have been described by several Anatomists. The first two are called *Superiores*, they rise from the hinder Processes of the *Sella Turcica*, or from the circular *Sinus's* of Doctor Ridley, and run along the upper Part of the internal Processes of the *Os Petrosum*, then descending they open into the *Laterales*.

Of the Inferiores.

There are two more called *Inferiores*; they rise from the same place with the other two, and running upon the Union of the *Os Petrosum* with the Occipital, they open into the *Laterales*,

rales, just as they are going out of the Skull.

There is a Fifth, which the curious *A fifth Sinus*, M. Du Verney demonstrates; it runs upon the third Process of the *Dura Mater*, and divides into two branches, of which one opens into the *Laterales*, and the other into the *Sinus Vertebrales*. That exact Anatomist Doctor Ridley, *Of the Circular Sinus*, in his Treatise of the Brain, gives account of a Sixth, which he calls the *Circular Sinus*, because it surrounds the *Glandula Pituitaria*; it communicates with the two *Superiores* and *Inferiores*.

Veza! hath remarked a *Sinus* which *Of three other Sinus's*, runs along the bottom of the *Falx*, and which opens into the Fourth *Sinus*; this is called by M. Du Verney, *Longitudinalis Inferior*. There are two more situated at the second Process of the *Dura Mater*, one on each side; they are about an inch wide from the *Laterales* into which they open; but these three do not always appear.

The Use of these *Sinus's* is to receive *The Use of the Sinus's*, the Blood of the adjacent Parts from the Veins, to which they are as so many Trunks, which discharge the Blood into the internal Jugulars.

The Vessels of the *Dura Mater*, are *Of the Vessels of the Dura Mater*, first a branch from the *Carotidals*, whilst it is in its long Canal, which is

is dispersed in the fore and lower Part of the *Dura Mater*. Secondly, An Artery with a branch of the internal Jugular Vein, which enter the hole of the *Cranium*, called *Foramen Arteriæ Durae Matris*; they are dispersed on the sides of this Membrane, and run as high as the *Sinus Longitudinalis*. Thirdly, a branch of the Vertebral Artery, and Vein which passes thorow that hole, where the Lateral *Sinus*'s join the Jugulars, they are dispersed in the hind part of the *Dura Mater*.

The Blood which is brought by the Arteries, is carried back by the Veins which go out at the same holes by which the Arteries enter; but in case the swelling of the Arteries, by a preternatural Fermentation of the Blood, should compress the Veins as they go out of the Skull, which might easily happen, being it has more Arteries than Veins; therefore there are several other Veins, which inosculate with the Arteries, and which carry the Blood from them into two small Veins, which are on the sides of the *Longitudinal Sinus*; 'tis these Veins which open into this *Sinus*, that the Blood, which was stoppt the other way, may have a free Circulation this way, as has been ingeniously observed by Dr. Ridley.

It

It hath also Nerves from the first branch of the fifth Pair, which give it an exquisite sense. It has a motion of *Systole* and *Diaſtole*, which is caused by the Arteries which enter the Skull. No doubt the great number of Arteries in the Brain contribute more to it, than those few proper to it self, which may assist a little, tho' not very sensibly, because of their smallness and paucity. The use of the *Dura Mater*, is to contain and cover the Brain, the Spinal Marrow, and all the Nerves, to divide the *Cerebrum* in two, and to hinder it from pressing the *Cerebellum*.

The *Pia Mater* is a thin and delicate ^{of the Pia} double Membrane which lies under the ^{mater.} *Dura Mater*, & covers immediately the Substance of the Brain; its inner Membrane is much larger than its outer Membrane, for it runs in betwixt all the Foldings and Circumvolutions of the Brain, to separate them, and to sustain the Blood-Vessels which make several turnings and windings upon it, before they terminate in the Substance of the Brain. It has proper Veins and Arteries, and the same use as the *Dura Mater*.

S E C T. III.

Of the Cerebrum and Cerebellum.

The Brains divided in two.

THE whole Substance of the Brains is divided into two Parts, that which lies mostly in the forepart of the Skull is properly called the *Cerebrum*, and that which lies in the back Part, under the hind Part of the *Cerebrum* (which is supported by the second Process of the *Dura Mater*) is called the *Cerebellum*. Both the one and the other are contained in the *Meninges* and in the *Cranium*, as in a case of Bones, that nothing may hurt their Substance, which is soft.

Of the Figure and Substance of the Cerebrum,

The *Cerebrum* is of a round Figure, it is divided down to the *Corpus Callosum*, by the first Process of the *Dura Mater* into the right and left side. Its external Surface resembles the turnings and windings of the Intestines. In the *Cerebrum* we distinguish two different Substances, the external which is of an ashy colour, and the internal which is of a white colour. Its external Substance is called *Substantia Corticalis* or *Cineritia*; it is soft, glandulous, and of the colour of ashes. Its internal called *Substantia Medullaris* is firmer, white, and fibrous; of it the Nerves are made, and it reaches to the Extremity

imity of the *Medulla Spinalis*, where it divides into Fibres.

The external Substance of the Brain, by its Circumvolutions, resembles the small Guts, and in the middle of each Circumvolution is the beginning of the Medullary Substance; so that the Cortical Substance is always on the external side.

Malpighius, who has examined this Cortical Substance, says, that it is nothing but a heap of little Oval Glands, which receive the Capillary branches of the Veins and Arteries which belong to the Brain, and which send out an infinite number of Fibres, which all together make up the Medullary Substance, which going out of the *Cranium*, forms the Nerves and *Medulla Spinalis* contained in the *Vertebrae*.

The internal Substance of the right and left side of the Brain coming to join one another, leave a space between them, which forms the three Ventricles of the *Cerebrum*, the upper Part or Covering of this space is called the *Corpus Callosum*; the bottom of this space is the internal Substance of the two sides of the *Cerebrum*, gathered together as it were in two bundles, which are called *Crura medullae Oblongatae*, upon them are the Protuberances called the *Corpora Striata*, and the *Thalami Nervorum*

*A general
Idea of the
Structure of
the Brain*

Nervorum Opticorum. These *Crura* uniting, make one Body called the *Medulla Oblongata*, upon which there are four Prominences called *Nates* and *Testes*: And behind these Prominences, the internal or medullary Substance or the *Cerebellum*, being also divided into two bundles, form upon each side of the *Medulla Oblongata*, three more Protuberances, and then it passes out of the *Cranium* into the *Vertebra*, where it gets the name of *Medulla Spinalis*. This is a general Idea of the Structure of the Brain, for the better understanding its Parts. Which we shall now describe in particular.

Below the Cortical Substance, the first thing that appears is the *Corpus Callosum*, it lies immediately under the first Process of the *Dura Mater*, it is the Covering of the two lateral Ventricles, formed by the Union of the Medullary Fibres of each side.

Of the two
Ventricles.

This being laid aside, the two lateral Ventricles appear, they reach from the forepart of the *Cerebrum* backwards; they are pretty broad in their hind Part; but they grow narrower towards their fore Part. They are divided into the right and left Ventricle by a thin transparent Membrane, which comes from the under side of the *Corpus Callosum*, and is extended to the *Fornix*,

Fornix, which is in the bottom of the Ventricks; this Membrane is called *Septum Lucidum*. I am apt to think it is a Production of the *Pia Mater*, which covers all the sides of these Ventricks. Of the Septum Medium,

In these two Ventricks there are four Prominences, two in each Ventricle. The foremost two are called *Corpora Striata*, which are the tips of the *Crura Medulle Oblongatae*. They are oblong, and their Extremities come down upon the sides of the two other Prominences; they are of a cineritious colour without, but in their internal Substance there are many white streaks which are the Medullary Substance mixed with the cineritious or glandulous. They are as it were tied together by a Medullary Process, called by *Vicussius*, *Commissura crassioris nervi Æmula*. Of the Corpora Striata,

The two other Prominences are called *Thalami Nervorum Opticorum*, because the Optick Nerves rise out of them; they are Medullary without, but a little cineritious within; they are of an oblong Figure; they are upon the upper Part of the *Crura Medulle Oblongatae*: between them there is a Medullary Tract, which encompasses them, called by *Willis*, *Limbi Posteriores Corporum Striatorum*. Upon them Of the Thalami Nerv. Optic.

Of the Plexus
Choroides.

them also lies the *Plexus Choroides*, made of Veins, Arteries, and little Glands. The Learned Dr. *Ridley*, says he has seen Lymphaticks rise from it. This *Plexus* reaches from one lateral Ventricle to the other, passing under the *Fornix*, above the third Ventricle. It sends a branch to the fourth *Sinus* of the *Dura Mater*.

Of the Fornix

In the middle above the *Corpora Striata* and the *Th. Nerv. Opt.* there lies a thin and broad Production of the Medullary Substance, which comes from the fore Part of the Ventricles by two Roots, and reaches to the hinder Part, where it ends by two other Protuberances called its *Crura*, which cover a great part of the *Thalami Nerv. Optic.* This Production is called the *Fornix*, because it is a Covering to the third Ventricle.

Of the third
Ventricle.

Under the *Fornix* there is a *Rima* between the *Crura Medulla Oblongata*, which is the third Ventricle, it being a little dilated in its forepart, there is a hole that goes down to the *Glandula Pituitaria*; this hole is the entry to the *infundibulum* or Funnel, so called because of its Figure. It is a small Conduit made of the Medullary Substance, covered with the *Pia Mater*; it pierces the *Dura Mater* upon the basis of the Skull, and sinks into the Substance of

Of the Infundibulum.

The

The *Glandula Pituitaria*, which is Of the Glandula Pituitaria. situated in the *Sella Turcica*, closely covered with the *Pia* and *Dura Mater*; it is of a harder Substance than the other Glands of the Body; it receives the end of the *Infundibulum*, which is supposed to carry a Liquor from the Ventricles into this Gland.

The *Rete Mirabile* is situated round Of the Rete Mirabile. this Gland; it is composed of Nerves from the fifth Pair, of Veins from the internal Jugulars, and Arteries from the *Carotides* and Cervical. It was commonly thought to be only in Beasts, but Dr. *Ridley* has discovered it also in Man, tho' it be less in him than in other Creatures. Its use is said to be to discharge the Serosity of the Blood, (which might hinder the Production of fine Animal Spirits) into the *Glandula Pituitaria*, which cannot do, because the Blood which is separate from this Serosity, goes not to the Trains, but is carried back immediately by the Veins.

But to return to the third Ventricle, Of the Anus. in its hinder Part there is another small hole called *Anus*, which leads into the fourth Ventricle in the *Cerebellum*. In the upper Part of this hole is situated the *Glandula Pinealis*, *Des Cartes* pre- Glandula Pinealis. tended Seat of the Soul, about the bigness of a Pease, and seems to have the

the same use as other Glands; it is tied by some Fibres to the

Of the Nates.

Nates, which are two Prominences of the *Medulla Oblongata*, situated above the fore-part of that Conduit, which leads from the *Annus* to the fourth Ventricle; they are of an Oval Figure, pretty big, and immediately behind them are two other Prominences of the same Figure and Substance called *Testes* both covered with a Net of Blood-Vessels. There is a small transverse Medullary Protuberance behind the *Testes*, from which the Pathetick Nerves rise.

Testes.

Isthmus.

The Conduit which reaches from the *Annus* to the fourth Ventricle, is in that Part of the *Medulla Oblongata* which is betwixt the *Cerebrum* and the *Cerebellum*, called the *Isthmus*. The upper Part or Cover of this Conduit which is betwixt the *Testes* and the foremost vermicular Process of the *Cerebellum*, to which two it is tied at its two ends, and to the Processes that come from the *Cerebellum* to the *Testes*, at its sides, is called *Valvula Major*; 'tis of a Medullary Substance, its use is to keep the *Lympha* from falling out above the Nerves in the basis of the Skull. These are all the Parts belonging to the *Cerebrum*.

Valvula major.

Now

Of the Cerebrum, &c.

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Of the Cerebellum.

Now the *Cerebellum* which is much less, is also composed of a Cortical and Medullary Substance; its Superficies makes not turnings and windings as that of the *Cerebrum*; but its foldings are straight, and they resemble the Segments of Circles, or the edges of Plates laid on one another; and these Segments are largest in its middle, and they grow less as they approach its fore and hind Part, where they seem to resemble too Worms; therefore called *Processus Vermiformes*.

Processus Vermiformes.

The Medullary Substance of the *Cerebellum*, as it approaches the *Medulla Oblongata*, gathers together, and then divides equally into two bundles, which are joined to the two sides of the *Medulla Oblongata*; as they separate, they leave a little space upon the upper side of the *Medulla*, which is called the fourth Ventricle, and its further end, because of its resemblance, *Calamus scriptorius*. The top of this Ventricle is covered with several Blood-Vessels woven like a Net.

Of the fourth Ventricle.

The Medullary Substance of the *Cerebellum* makes three Processes upon each side of the *Medulla Oblongata*. The first two go on each side of it to the *Valvula Major* is betwixt them. The second two are pretty broad; they go straight down on each side,

Of the Processes of the Cerebellum.

Processus An-
nularis.

side, and meet on the under side of the *Medulla*; they make that Protuberance called *Processus Annularis*; and the Third goes backwards upon the upper sides of the *Medulla*; they make it look bigger, being like two Cords upon its sides.

This is all that is remarkable in the *Cerebrum*, *Cerebellum*, and upper side of the *Medulla Oblongata*. But if you turn over the Brain, you may see distinctly the rise of all the Nerves, the *Infundibulum*, the *Crura Medulle Oblongate*, one on each side of the *Cerebrum*: where they join you may see the *Processus Annularis*; and beyond that there are two Prominences called *Corpora Pyramidalia*; they are about an inch long; and on each side of them, towards their lower end, there are two more, which, because of their figure, are called *Corpora Olivaria*, and thence the *Medulla Oblongata* goes out of the Skull, being contained in the *Pia* and *Dura Mater*.

Corpora Py-
ramidalia and
Olivaria.

Observe that the *Medulla Oblongata*, with all the Protuberances which are upon its upper and lower sides are not purely of the Medullary Substance, but internally they are mixed with the Cortical; and it is this mixture which makes that they call *Stria* to which they have given different
imag

imaginary Uses, according to their different Positions.

Now the Vessels of the Brains are Nerves, Veins and Arteries. The Nerves are ten Pair. The first Pair, are the Olfactory Nerves; they rise from the basis of the *Corpora Striata*, and pass thorow the holes of the *Os Cribriforme*. The second Pair are the Optick Nerves; they rise partly from the Extremities of the *Corpora Striata*, and partly from the *Thalami Nervorum Opticorum*, which they almost embrace; they unite together above the *Cella Turcica*, and immediately dividing again, they pass thorow the two foremost holes in the *Os Sphenoides*. The third Pair are Movers of the Eyes; they rise on each side of the *Infundibulum* from the *Medulla Oblongata*, and go out at the *Foramina Lacera*. The fourth Pair are the Parathetick Nerves; they rise from the small Medullary Cord which is behind the *Testes*, and pass thorow the *Foramina Lacera*. The fifth Pair rise from the fore Part of the *Processus Angularis*; they give Nerves to the *Dura Mater*; each of them divides into three branches; the first passes out at the *Foramen Lacerum*, the second at the third hole of the *Os Sphenoides*, and the third thorow another hole of the same Bone. The sixth Pair rises from

H 2 the

the sides of the *Processus Annularis*, and goes out at the *Foramen Lacerum*, but just before it goes out, it casts back a branch, which makes the root of the Intercostal Nerve; this goes out at the Canal thorow which the Carotidale Artery enters. The seventh is the Auditory Nerve, it rises from the hind Part of the *Processus Annularis*, and enters the hole in the Process of the *Os Petrosum*. The eighth Pair is the *Par Vagum*, it rises from the *Medulla Oblongata* behind the *Processus Annularis* by three several Threads which join in one, and it goes out at the same hole the lateral *Sinus's* open into the *Jugulares*. The ninth Pair rises from the *Processus Olivares* of the *Medulla Oblongata*, and passes out at a hole in the Occipital Bone, which is proper to its self. The tenth and last Pair rises by several Fibres from the beginning of the *Medulla Spinalis*, from thence ascending within the *Occiput*, it turns and passes out at the same hole thorow which the Vertebral Artery enters, between the first Vertebra and the Occipital Bone, running thorow a *Sinus* in this Vertebra. These are the Nerves of the Brain, which we shall trace further in the Eighth Chapter.

The Arteries are the two internal Carotidals which pass thorow two oblique Canals in the *Ossa Petrosa*; as soon as they enter the Skull, they give a branch which enters the Orbit of the Eye; they give branches which make the *Rete Mirabile*, then they pierce the *Dura Mater* on each side of the *Infundibulum*; they communicate with the Cervical Artery, and they give branches to the *Plexus Choroides*, and are distributed thorow all the Substance of the Brain: their branches make many turnings and windings upon the *Pia Mater*, and at last are lost in the little Glands of the Cortical Substance of the Brain.

The two Vertebral Arteries which come out of the holes in the transverse Processes of the *Vertebrae*, enter the large hole of the Occipital Bone; they pierce the *Dura Mater*, and go along the under side of the *Medulla Oblongata*; then they cast back two branches for the Spinal Arteries, and at the *Processus Annularis* they join in one branch called the *Cervical Artery*. This communicates with the two *Carotides*, by two branches called the *Communicant* branches; then it divides again into two, which give branches to the *Rete Mirabile*, *Plexus Choroides*, and they are afterwards distributed thorow

all the Substance of the Brain, ending in the Cineritious Substance as the *Carotidales*.

The Veins enter not the *Cranium* at the same holes that the Arteries do, because, as Dr. *Ridley* rightly observes, upon any Fermentation of the Blood, the Swelling and Pulse of the Arteries would compress the Veins against the bony sides of their Passage, and so cause a Stagnation and Extravasation of the Blood in the Brain, which would be the destruction of the whole Machine. Neither do the Veins run along by the sides of the Arteries in the Brain, as they do thorow all the rest of the Body, but they rise from the Extremitiess of the Arteries, in the Cineritious Substance of the Brain, and go streight to discharge themselves into the *Sinus's* of the *Dura Mater*.

The Use of the
Brain.

The Blood which is brought into the Brain by the Carotidal and Vertebral Arteries, is separated by the Glands, which make the Cineritious and Cortical Substance of the Brain, from its finest and most subtile Parts, which they call Animal Spirits, which are received from the Glands by the Fibres of the Medullary Substance which is the beginning of the Nerves: the Blood which remains, is taken up by the Veins which are the branches of this

the *Sinus's*, which discharge themselves in the Lateral *Sinus's*, which pour the Blood into the internal Jugulars to be carried back to the Heart.

This is all the use we know of the Brain in General. As to the particular Use of its Parts, the Seat of the Soul, of the Memory, the Imagination, and the Judgment that Authors have so wittily determin'd, I am apt to think that it was more Fancy than Judgment that determin'd them to think so. We shall speak of the *Medulla Spinalis*, in the Third Section of the Eighth Chapter.

S E C T. IV.

Of the Eyes.

THE Organs of Sight are divided into two Parts; The internal Part which is the Globe or Body of the Eye, and the external Part, which is those Parts about the Globe subservient to the Globe.

The first of these last are the Eye-brows, which are nothing but some Hairs bunching out above the Eye, by some Fat which is under the Skin in this place. They break the Rays of Light that they be not directly darted into the Eyes, which would greatly offend the Sight, as they do

Of the Eye-brows.

when we look directly upon the Sun.

Eye lids.

The next are the Eye-lids, two to each Eye. The upper Lid moves very quickly, the under very undiscernibly.

Its Muscles.

The upper Eye-lid is lifted up by the *Musculus Rectus*, which rises from the bottom of the Orbit of the Eye, where the Optick Nerves pierce the *Cranium*, and passing above the *Musculus Superbus*, 'tis inserted by a large tendon to the border of the Eye-lid.

Both Lids are brought together to shut upon the Eye by another Muscle called *Orbicularis*. It rises from the great Angle of the Eye, and its Fibres are spread two fingers breadth, covering the under Lid, they reach to the little *Canthus*, from which continuing its circular Fibres which cover the upper Lid, it is inserted into the same place from which it arose. Some Authors divide this Muscle into two, the Superior and Inferior, which they make to rise from the great *Canthus*, and to be inserted into the little *Canthus*.

Of the Conjunctiva.

The Eye-lids are covered within with a smooth Membrane called *Conjunctiva*, because it is continued upon the forepart of the Globe, constituting that which we call the white of the Eye; it joins the Globe to the Edges of the Orbit.

The

The edges of the Eye-lids have two small and soft Cartilages, like the Segments of a Circle, called *Cilia*; they keep the Eye-lids extended, that every Part may be equally raised. Upon them there is a rank of small Glands, whose excretory Channels open upon the edges of the Lids. They yield a wax which fasteneth the Eye-lids together whilst we sleep. They are covered with the Skin externally, and with the *Conjunctiva* internally. Upon the edges of the Lids, there are also some hairs in form of a Pallisado, to preserve the Eyes, as the Eye-brows do, and to hinder any filth or flies from falling into the Eyes.

In the backside of the *Conjunctiva*, Of the Glandula Lachrymalis. upon the upper Part of the Globe is the *Glandula Lachrymalis*, pretty large, divided into several Lobes, each of which send out an Excretory Channel, which opens in the foreside of this Membrane, where it covers the upper Lid. This Gland separates the Matter of the Tears, which by the continual motion of this Lid, moisten the *Cornea*, which otherwise would dry and wrinkle by the continual action of the external Air.

In the great *Canthus* of each Eye, Puncta Lachrymalis. there are two holes called *Puncta Lachrymalia*; they are the two Orifices

of the Lachrymal Sack, which is situated in this corner, upon the *Os Lachrymale*; from the bottom of which there goes a small Pipe, which pierces this Bone into the Nose, and opens under the upper *Lamina* of the *Os Spongiosum*. It moistens the inner Membrane of the Nostrils, by the humour of the Lachrymal Gland, which runs from off the Globe into them. Sometimes the Acrimony of this humour causeth sneezing, which we hinder, by pressing the Angle of the Eye, and so stop its running.

Between these two *Puncta* there is a Caruncle which serves to keep them open when the Eyes are shut. This Caruncle was thought to be the *Glandula Lachrymalis*.

Of the Muscles
of the Eye.

The Globe of the Eye is moved by four straight Muscles, and two oblique; and betwixt them there is a great deal of Fat, which facilitates the motion of the Globe.

The first of the four straight Muscles is called *Attollens* or *Superbus*; it lies upon the upper Part of the Globe; it pulleth up the Eye when we look up. The second is called *Deprimens* or *Hammilis*; it pulleth down the Eye. The third is called *Adductor*, it draweth the Eye towards the Nose. The fourth *Abductor*, it draweth the Eye towards the

the little *Canthus*. They rise all four from the Circumference of the hole in the Orbit, thorow which the Optick Nerves pass, and they terminate about the *Cornea*, by four pretty large Tendons : When they all act together, they draw the Eye towards the bottom of the Orbit. When the *Superbus* and the *Adductor*, or the *Abductor* act together, or the *Humilis* and the *Adductor*, or *Abductor* act together, they perform the Oblique Motions, which have been attributed to the Oblique Muscles.

The first of the Oblique Muscles, which is the fifth of the Eye, is the *Obliquus Minor*; it rises from the lower side of the Orbit near its external Circumference, where the first and second Bones of the upper Jaw join together, and ascending obliquely by the upper corner of the Eye, 'tis inserted to the upper and external side of the Globe, behind the Tendon of the *Abductor*.

The second of the Oblique Muscles and sixth of the Eye, is the *Obliquus Major*; it rises from the bottom of the Orbit, and marching obliquely towards the great *Canthus*, in the upper Part of which, near the brink, there is a Cartilaginous ring, thorow which it passes its round Tendon, from whence reverting backwards, it's inserted.

ted into the upper Part of the Globe, behind the Tendon of the *Attollens*.

The Use of the first of these Muscles is to draw the Globe of the Eye forwards, and to turn its Pupil upwards; and of the second, to draw it forwards, and to turn its Pupil downwards, for the better receiving of the rays of light, which could not be performed by any of the other four Muscles; as Mr. Cooper has very well observed. And both of them are an Axis for suspending the Globe, by which, in its almost continual motion, 'tis moved the more easily; as has been ingeniously observed by M. De la Hire.

Now the Globe of the Eye is of a Sphærical Figure; in it are contained the principal Instruments of Vision; 'tis composed of Coats and Humours.

Of the Con-
junctiva.

The first Coat is the *Conjunctiva*; it makes the white of the Eye; it hath been already described; it is full of small Veins and Arteries, which appear big in an *Ophthalmia* or Inflammation of the Eyes.

Sclerotica.

The second is called *Sclerotica*; 'tis thick, hard, and smooth, opake behind, but transparent before, where it makes the

Cornea.

Third Coat called *Cornea*, because it is transparent, like the Horn of a Lantern, in the fore-part of the Eye, which is

is surrounded by the white of the Eye: It is a little more Convex than the other Coats, bunching out more forwardly than the *Conjunctiva*.

The fourth is the *Choroides*; it lies *Choroides* under the *Sclerotica*; 'tis much thinner than it; it hath a great number of Blood and Lymphatick Vessels which come from the second, and which are spread upon it, as also several Glands which separate from the Blood-Vessels, a black Liquor, which tinctures all this Membrane internally, which is otherwise of a whitish colour. This Coat is open, or has a hole before, for the passage of the rays of light, called *Pupilla*; that Part of this Coat which makes the Circumference of this hole, and which lies upon the sides of the Chrystalline humour, is

The fifth Coat called *Uvea*, which *Uvea* is made of circular and straight Fibres; it contracts and dilates according to the different impressions of light and of Objects.

The *Iris* is that Part of the *Uvea* *Iris* where the different colours appear. On the inside of the *Uvea*, from its Circumference, rises the *Ligamentum Ciliare*. It is made of Fibres which spread themselves upon the sides of the Chrystalline Humour, like Lines drawn from the Circumference to the Centre.

These

These Fibres, by their Contraction and Dilatation, press the ChrySTALLINE Humour backwards, forwards, and change its situation, according as the distance of Objects require.

Retina.

The sixth is the *Retina*, so called, because it resembles a Net, which covereth the bottom of the Cavity of the Eye; 'tis nothing but an Expansion of the Medullary Substance of the Optick Nerves; 'tis on this Coat that the impressions of Objects are made.

Of the Aqueous Humour.

The Humours of the Eye are three. The first is called the *Aqueous*; it lies in the forepart of the Globe, immediately under the *Cornea*, which it makes to bunch out a little, that it may receive the rays, which come directly and obliquely from the Object; this Humour is thin and liquid, of a spirituous Nature; for it shall not freeze in the greatest Frost, and a great part of it evaporates some days after Death, when it receives no new supply. This evinces the necessity of a continual supply for this Humour, which in effect it hath: for if the *Cornea* be pricked, and this Humour squeezed out, it shall be restored again in the space of ten or twelve Hours, by an Aqueous Duct, which rises from that branch of the Carotide Artery which goes to the Eye, and creeping upon the

the *Tunica Sclerotica*, it pierces the Globe near the *Pupilla*, where it pours out at several Orifices, its spirituous Liquor.

The second Humour is the Chry-
stalline; it lies immediately next to the Aqueous, under the *Uvea*, opposite to the *Pupilla*, nearer to the forepart, than the back part of the Globe; it is the least of the Humours, but much more solid than any of them; its Figure, which is Convex on both sides, resembles two unequal Segments of Spheres, of which the most Convex is its back side, which makes a small Cavity in the Glassy Humour in which it lies. It is covered with a fine Coat called *Aranea*, and the Fibres of the *Ligamentum Ciliare* are spread upon its sides.

*Chrystalline
Humour.*

The third is the Glassy Humour; it hath a great resemblance to the white of an Egg; it filleth all the hind part of the Cavity of the Globe. It is in a greater abundance than the other two. It is thicker than the Aqueous, but thinner than the Chrystalline Humour. It is contained in a very fine Coat of the same Name. It gives the Spherical Figure to the Eye. Upon its back part the *Retina* is spread, which it holdeth from the *Chrystalline* Humour at a distance, requisite

*Of the vitreous
Humour.*

quisite to receive the impression of Objects distinctly.

Of the Vessels
of the Eyes.

The Vessels of the Eyes are Veins; and Arteries from the external Carotide and Jugular, which are distributed upon the external Parts of the Eyes,, and a Vein from the superior *Sinuss* of the *Dura Mater*, in the basis of the Skull, and an Artery from the internal Carotidale. They accompany the Optick Nerves, and are distributed on the Muscles and Globe of the Eye.

There are also some Lymphaticks; which accompany the Vessels. The Nerves of the Eyes are,

Of their
Nerves.

The Optick Nerves; they are pretty big and round; they pierce the Globe of the Eye; and their Medullary Fibres are expanded upon the hind part of the Glassy Humour, which Expansion is called the *Retina*.

The third Pair of the Brain called *Motorii*; The fourth Pair called *Pathetici*, the first branch of the fifth Pair called *Ophthalmicus*, and the sixth Pair are all bestowed upon the Muscles of the Eyes.

Of Vision.

All the Rays which come from one Point of an Object are, by the *ChrySTALLINE* Humour, united in a Point of the *Retina*; which is in a straight Line, drawn from the same Point of the Object, thorow the Centre of the *ChrySTALLINE* line

line Humour; and consequently all the Rays, which come from all the Points of an Object, are, by the *Chrystalline* Humour, united in the *Retina*, in the same Order and Proportion, as the Points of the Object are from whence these Rays come. Therefore the impression which these Rays make upon the *Retina*, must be the Image of the Object.

Thus in general, Vision is Performed. But now let us see what the other Parts of the Globe conduce in this Action. We have said, that the *Cornea* was more Convex than any other Part of the Globe, by which means, all the Rays are gathered to pass thorow the *Pupilla*, and none of them are lost upon the *Uvea*.

The *Aqueous* Humour being the thinnest and most liquid, easily changes its figure, by which means the Globe is rendered more or less Spherical, according as the distance of the Objects require.

The straight Fibres of the *Uvea* dilate the *Pupilla*, when there are but few Rays of Light, and the circular Fibres contract it when there are too many. The *Ligamentum Ciliare* presses the *Chrystalline* Humour nearer to the *Retina*, when Objects are at a greater distance from the Eye; for Rays, from
a near-

*How the Parts
of the Eye
contribute to
it.*

a nearer Object, unite at a greater distance behind the Chrystalline Humour, and Rays, from a more remote, at a lesser. The Glassy Humour keeps the Chrystalline Humour at such a distance from the *Retina*, as is necessary for uniting the Rays, which come from one Point of the Object, exactly in one Point of the *Retina*.

The impressi^on of the Object is made upon the *Retina*. The *Choroides* is tinctured black, that the Rays of Light which pass thorow the *Retina*, may not be reflected back again, to confute the Image of the Object.

Being distinct, Vision consists in the union of all the Rays which come from one Point of an Object exactly in one Point of the *Retina*; and that the Rays which come from Objects at different distances, are united at different distances, behind the Chrystalline Humour; they cannot both be united exactly upon the *Retina*; therefore the Eye cannot see equally distinctly at the same time Objects at different distances. It is for this reason that the Globe of the Eye moves so quickly and almost continually, and that the Muscles of the Eyes have such a great quantity of Nerves to perform their motion.

When

When the Globe of the Eye is flat, as happens sometimes in old Age, that the Rays, if produced, should pass the *Retina* before they unite, in such a case there is no distinct Vision, and such as have this defect, are called *Presbitæ*. And if contrary, the Globe of the Eye be so Convex as to unite the Rays before they come to the *Retina*, then there is no distinct Vision neither; and such as have this defect are called *Myopes*.

S E C T. V.

Of the Ear.

THE Ear is divided into the External and Internal. The External Ear (whose Parts have already been described) is composed of the Skin, a Cartilage, and a little Fat. The Skin of this Part is thin and smooth, it sticks close to the Cartilage by means of a fine Membrane. The Cartilage is in that Part of the External Ear called the *Pinna*; and the Fat in that Part called the Lobe. The Vessels of the External Ear, are Veins from the *Jugulares*, Arteries from the *Carotidale*, and Nerves from the *Portio Dura*, and second Pair of the Neck.

The External Ear is tied to the *Oss Petrosum*, by a strong Ligament, which comes from the backside of the *Pinna*, tho

tho' the Ear has but a very obscure Motion, yet it has two Muscles. The first arises from the outside of the frontal Muscle, where it joins the *Crotaphire*, and is inserted into the upper and back part of the *Pinna*. The second arises from the upper and foremost part of the *Processus Mammillaris*, and is inserted into the middle and back part of the *Concha*. The first draws the Ear upwards, and the second draws it downwards and backwards. The use of the External Ear is to gather the Sounds, and to carry them to the Internal. Its Inequalities and Circles do moderate the violence of the Air.

Of the Meatus
Auditorius.

The Internal Ear begins at the Conduit which goes from the middle of the *Concha* to the *Tympanum*; it is called *Meatus Auditorius*. It is Cartilaginous from the *Concha* till within a little of the *Tympanum*, where it is Bony. It is crooked, running first upwards, and then downwards to the *Tympanum*. It is about an inch long. It is slit on its upper side towards the Temple. It is covered within by a pretty thick Membrane. Betwixt this Membrane and the Cartilage, especially where it is slit, there are a great number of little Glands, whose Excretory Channels piercing this Membrane, carry a yellow sort of Excrement

ment into the *Meatus*, which hinders Insects, or any other thing, to enter the Ear.

At the further Extremity of this Conduit, there is a thin transparent Membrane stretched out like the Head of a Drum, upon a bony Circle, only in its upper Part it's loose and not tied to it. The handle of the *Malleolus* is tied to this Membrane, and there runs a small twig of a Nerve from the fifth Pair upon its inside, called *Chorda Tympani*. This Membrane is properly the Partition between the External and Internal Ear. It is called *Tympanum*.

Behind this Membrane there is a pretty large Cavity called the *Barrel*; it is about three or four lines deep, and five or six wide. It is lined with a fine Membrane, on which there are several Veins and Arteries. It is always full of a purulent Matter in Children. In this Cavity there are four small solid Bones, not covered with a *Periosteum*, as the rest of the Bones of the Body are.

The first is the *Malleolus* or Hammer, so called, because of its shape. Its Head has on its lower side two Prouberances and a Cavity whereby it's joined to the *Incus* by *Ginglimus*; its handle, which is pretty long and small, is fastened to the *Tympanum*. Near its Head

Head it has two small Processes, into which there are two Muscles inserted.

Its Muscles.

The first is called the *Externus*; it arises from the upper and external side of the *Meatus Auditorius*, and is inserted into the upper and longer Process of the *Malleolus*: This Muscle pulleth up the Head of the *Malleolus*, so its handle falls lower, and consequently the *Tympanum* is relaxed. This is necessary when sounds are too great, which might break the *Tympanum*.

The second is called the *Internus*; it arises from the Extremity of the Conduit which goes to the Mouth. It lies in a small Channel made in the *Os Petrosum*, and is inserted into the lower and lesser Process of the Hammer. When this Muscle acteth, the head of the Hammer is pulled down, its handle lifting up, and consequently the *Tympanum* distended, which is necessary when the Sounds are low.

Incus.

The second small Bone is called *Incus*, the Anvil. It has a Head and two Legs. Its Head has a Protuberance and two Cavities, whereby it is articulated with the Hammer; the shorter of its Legs is tied to the side of that Conduit which goes to the *Processus Mamillaris*, and its longer Leg to the Head of the third Bone called,

Of the Stapes.

The *Stapes* or Stirrop, because of its resem

resemblance. 'Tis of a triangular Figure, being made of two branches set upon a flat basis, which stands upon the *Foramen Ovale*. The space between the two branches is filled up by a fine transparent Membrane; the union of the two branches is called the Head of the Stirrop, in which there is a small Cavity, in which lies the fourth Bone. There is a small Muscle which arises out of a small Channel in the bottom of the Barrel, and which is inserted into the Head of the Stirrop.

The *Os Orbiculare*, which is a very small Bone, being convex on that side which is received in the Cavity of the Head of the Stirrop, and hollow on the other side, where it receives the strong Leg of the Anvil, which is only joined to the Stirrop, by means of this fourth Bone.

Besides these Bones, there are several holes in the Barrel. The first is in its forepart nearest the *Tympanum*. It is the entry to the *Sinus* in the Mammillary Process. The second is the Orifice of Conduit which opens behind the Palate of the Mouth. The beginning of this Conduit is bony, and its Extremity which is near the *Uvula*, is Membranous. Part of the Air which we breathe enters by this Conduit into the Ear. The third and fourth are at the further

of the *Os Orbiculare*.

Of the holes in the Barrel.

further end of the Barrel opposite to the *Tympanum*. The one is called *Fenestra Ovalis*. The basis of the Stirrup stands upon it. It is the entry to the *Vestibulum*. The other is called *Fenestra Rotunda*. It is covered by a fine Membrane, inclosed in a rift of this hole. It leads to the *Cochlea*.

Of the Vestibulum.

The *Vestibulum* is a Cavity in the *Oss Petrosum*, behind the *Fenestra Ovalis*, it is covered with a fine Membrane; in it open the Semicircular Pipes of the Labyrinth. The upper turning of the *Cochlea*, and the Auditory Nerve pierces into it also.

Of the Labyrinth.

The *Labyrinth* is made of three Semicircular Pipes excavated in the *Oss Petrosum*; they open by five Orifices into the *Vestibulum*. That which is called the Superior Pipe, joins one of its Extremities with one of the Extremities of that which is called the Inferior Pipe, and these two Extremities open by one Orifice, but the middle Pipe opens at each end by its self into the *Vestibulum*.

Of the Cochlea.

The last Cavity of the Ear is the *Cochlea*; it resembles a Snail's Shell. Its Canal which winds in a Spiral Line is divided in two, the upper and lower by a thin *Lamina Spiralis*. The upper Part of this *Lamina* is membranous, where there are several holes, thorough which

which twigs of the Auditory Nerve pass from the one Canal to the other. The upper Canal opens into the *Vestibulum*, and the lower into the Barrel by the *Fenestra Rotunda*.

The Vessels of the internal Ear are *Of the Vessels of the Ear.* Arteries and Veins from the internal *Carotidale* and *Jugulars*. The *Nervus Auditorius* enters by the hole in the upper Part of the *Os Petrosum*. It divides into two branches, of which one is hard, the other soft. Its *Portio Mollis* is distributed thorow all the *Cochlea* and *Labyrinth*, and the *Portio Dura* is bestowed on the external Parts about the Ear.

A Sound is nothing but a certain *Of Hearing.* Refraction or Modulation of the external Air, which being gathered by the external Ear, passes thorow the *Meatus Auditorius*, and beats upon the *Tympanum*, which moves the four little Bones in the Barrel; in like manner as it is beat by the external Air, these little Bones move the internal Air which is in the Barrel and *Vestibulum*: which internal Air makes an impression upon the Auditory Nerve in the *Labyrinth* and *Cochlea*, accordingly as it is moved by the little Bones in the Barrel; so that according to the various Refractions of the external Air, the internal Air makes
I various

various impressions upon the Auditory Nerve, the immediate Organ of hearing; these different impressions represent different Sounds.

S E C T. VI.

Of the Nose.

Of the external Nose.

THE Nose may be divided into two Parts, the External and Internal. The External Nose is covered with the Skin and some Muscles, of which afterwards. Its upper Part consists of two Bones closely joined together, on their upper side. Its lower Part is made of four Cartilages, of which the first two are fixed to the lower ends of the fore-said Bones; they are also joined together on the upper side; they are pretty broad, and as they approach the tip of the Nose they grow thinner and softer. The other two lie upon the lower ends of the first two, to which they are tied by a Membrane; They are called *Narium Ala*.

The Cavity made by these Bones and four Cartilages is divided in its middle into two Nostrils, by a Partition, of which the upper end is bony, the lower end Cartilaginous; the fleshy Extremity of this Cartilage is called *Columna*.

The upper end of each side of this Cavity divides into two, of which one goes up to the *Os Spongiosum*, the other goes down into the *Fauces*, and opens behind the Palate, by which means we breath thorow our Nostrils. At the lower end of this Cavity, there are two small holes which pierce the Bone of the Palate and open in one behind the *Dentes Incisivi*; they carry the thin Rheum of the Nostrils into the Mouth.

This Cavity is covered by a pretty thick and glandulous Membrane; its Glands separate that Matter which we call *Mucus* into the Nostrils. On the lower end of this Membrane, there grow several Hairs called *Vibrissi*; they with the *Mucus* which the Glands separate, stop any filth from ascending too deep into the Nostrils.

By the internal Part of the Nose, Of the internal Nose. we understand the immediate Organ of Smelling; it lies in the upper Part of the Cavity of the Nostrils, it is made of the *Os Cribriforme* and its Productions, the *Os Spongiosum*, of which each *Lamina* is covered with a fine Membrane, upon which the Fibres of the Olfactory Nerve, which pass thorow the holes of the *Os Cribriforme*, and the Fibres of the first branch of the fifth Pair, which come from the Orbit are spread.

In this Membrane there are many small Glands which separate an humour which moistens it, and stops the Exhalations of odoriferous Bodies, which make their impression upon the Olfactory Nerves which are spread upon it. Greyhounds and other Beasts which have a more exquisite smell than Men, have also many more *Laminae* covered with such a Membrane.

Of the Conduits which open in the Nose.

There are several Conduits which open between these *Laminae*. The first and second are the *Ductus Lachrymales*, of which we have spoken before. The third and fourth come from the *Sinus Frontales*. The fifth and sixth come from the *Sinus's* of the second Bone of the upper Jaw. The seventh and eighth come from the Cells of the *Os Spongiosum*, they pierce the Membrane which covers the first or uppermost *Lamina*; And the ninth and tenth come from the *Sinus* in the *Os Sphenoides*. All these Conduits carry the Liquor, which is separate in their Cavities into the Nostrils, for the moistening its Membranes, which otherwise would dry too much by the Air which we breath thorow our Nostrils.

Of the Vessels of the Nose.

The Vessels of the Nose are Arteries from the Carotidals which pass with the Olfactory Nerve, they are distributed in the internal Nose; the external

nal Carotidal and Jugular, and the second branch of the fifth Pair give Arteries, Veins, and Nerves to the external Nose. Some give an account why the sinell of Bodies, which consist of acrimonious Parts, draw tears from the Eyes, and why the want of Taste does ordinarily accompany the want of Smelling, by the communication of the branches of the fifth Pair of Nerves which are distributed thorow these three Senses.

S E C T. VII.

Of the Mouth and Tongue.

THE Parts of the Mouth are the Lips, the Gums, the Palate, the *Uvula*, and the surrounding Glands.

The Lips are made up of several Muscles, of which afterwards. Their use is to shut the Mouth, and to articulate the Voice. *Of the Lips and Gums.*

The Gums are a hard sort of Flesh formed by the union of two Membranes, one of which is a Production of the *Periosteum*, and the other of the internal Membrane of the Mouth: They are set about the Teeth, to keep them firm in their Sockets.

The Palate or Roof of the Mouth *Of the Palate.* is covered with a pretty thick Membrane which is continued to the Tongue.

filis ; upon it there are a great number of little Glands whose Excretory Ducts piercing it like a Sieve, discharge a Liquor for the moistening and dissolving of the Aliments. It is an Error to think that the Palate tastes, for by it it's impossible to distinguish the most acrid Substances.

*Of the Uvula
and its Mus-
cles.*

The *Uvula* is a Reduplication or Production of the internal Membrane of the Mouth; its Substance is very lax, and it has a number of small Glands as in the Palate : It is somewhat long, of a Conick Figure; it hangs from the Roof of the Mouth near the Passage which comes from the Nose, above the seat of the *Larynx* between the Tonsils. It is moved by two Pair of Muscles, which are

The *Pterigostaphilinus Externus*; it arises fleshy from a small Protuberance, upon the under side of the Body of the *Os Sphenoides*, and goes directly to be inserted into the hind Part of the *Uvula*.

The *Pterigostaphilinus Internus* arises from the same Protuberance of the *Os Sphenoides*, and growing into a small round Tendon, which passes over a small Process, like a hook, of the *Processus Pterigoides*, from thence reverting, it's inserted into the forepart of the *Uvula*.

When

When the first of these Muscles acteth, it pulleth the *Uvula* backwards; when the second contracteth, it pulleth the *Uvula* forwards, because of the Pulley thorow which its Tendon passes, which alters the direction of its Motion; both which Motions are necessary for articulating the Voice, and in deglutition, that nothing may regurgitate into the Nose which we take by the Mouth.

The Glands, which are the sources ^{Of the Parotides.} of the Spittle, which discharges it self into the Mouth, are in great number, of which the principal are the *Parotides*, one on each side, situated under the Ear, above the *Masculus Masseter*; they are of the Conglomerate sort, being made up of a great number of smaller Glands; each of which sends out a small Excretory Duct, and they all unite and form one Channel called *Ductus Salivalis Superior*, which running over the Cheeks, pierces the *Buccinator*, and opens in the Mouth; when the *Masseter* acteth in Mastication, it presses the *Saliva* into the Mouth.

The *Maxillares* which are situated ^{Of the Maxillares.} within the under Jaw, one in each side, are also of the Conglomerate sort; the Excretory Pipes of their small Glands unite, and form two Ducts, which both together open under the

tip of the Tongue, on the inside of the *Dentes Incisivi*, where they have each a small *Papilla* at their Orifice. When the Muscles of the Tongue or lower Jaw act, they compress these Glands.

Of the Sub-
linguales.

The *Sublinguales* are one on each side of the Tongue; they have two Excretory Ducts as the former, formed by the Union of that of each small Gland; they run on each side of the Tongue, near its tip, where they open into the Mouth at a little distance from the Gums; when the *Mylohyoideus* acteth, it compresses them.

Of the Ton-
sillæ.

The *Tonsillæ* or Almonds appear also two, one on each side of the *Uvula*, tho' really they are continued to one another, under the common Membrane of the Mouth, with which they are covered; each of them hath a large Oval *Sinus*, which opens into the Mouth, and in it there are a great number of lesser ones, which discharge themselves thorow the great *Sinus* of a mucous and slippery Matter into the *Fauces*, *Larynx*, and *Oesophagus*, for the moistening and lubricating these Parts; when the Muscle *Oesophagus* acteth, it compresseth the *Tonsillæ*.

Besides these, there are a great number of little Glands spread upon the Cheeks and Lips, whose Excretory Channels open into the Mouth; and
all

all of them separate the *Saliva* or Spit-
tle, which conduces in the dissolution
of the Aliments.

The Tongue is connected in the
Mouth to the *Os Hyoides*, to the *La-
rynx*, and by a membranous Ligament
which is in the middle of its lower
side. Sometimes this Ligament is con-
tinued to the tip of the Tongue,
and then it hindereth Children from
Sucking; therefore in such a case it
should be cut.

The Tongue is covered with two
Membranes. The External hath upon
its upper Part, and particularly to-
wards the tip of the Tongue, a great
number of *Papilla*, of a Pyramidal
Figure; they stand not up straight, but
incline towards the basis of the Tongue;
they appear not so plainly in Men as
in Brutes, in some of which last they
grow Cartilaginous. Each *Papilla* has
a small root, which makes a small hole
in the viscus Substance, which lies be-
tween the two Membranes. In Men
the chief use of these *Papilla Pyrami-
dales* seems to be for preserving the
Papilla Nervosa, which are of a softer
Substance, that they be not hurt by
the hardness or roughness of the Ali-
ments: And in Beasts, which feed
upon Grass, which they gather toge-
ther with their Tongue, these *Pa-
pilla*

*Of the Mem-
branes and
Papillæ of the
Tongue.*

pilla are like so many Hooks for the grasping, cutting, and pulling of the Grass; and perhaps by their roughness rubbing upon the Palate, they conduce to press the Spittle out of the Glands.

Under the External Membrane there lies a thin viscous Substance which is white, on that side next the External Membrane, and black on that side next the Internal. When the Tongue is boiled, this Substance hardens, and is like a Searce being full of small holes, made by the roots of the *Papilla Pyramidales*.

The Internal Membrane is thin and soft; upon it there appear several *Papilla* made of the Extremities of the Nerves of the Tongue, therefore they are called *Nervosa*: They are situated upon the sides of the Tongue, but chiefly towards its tip; they resemble the small Horns of a Snail; for their Extremities are round and bigger than the rest of their Bodies. The Extremity of each *Papilla* pierces the External Membrane of the Tongue. They quit those holes, and remain on the Internal Membrane, when the External is raised. These *Papilla* are the immediate Organ of Tasting.

Of its Substance.

The Substance of the Tongue is muscular, being made of Plans of Fibres of different Directions. The

The first or External Plan is made of straight Fibres, which surround the Tongue, reaching from its Basis to its Point; when they contract they shorten the Tongue. Under them there are several Plans of Fibres, which run from one edge of the Tongue to the other; they draw the edges of the Tongue together. There are also several Plans of Fibres, which run from the under to the upper side of the Tongue; when they contract, they make the Tongue broad and thin. These two sorts of Fibres cross one another at right Angles, and they lie *Stratum super Stratum*, from the tip of the Tongue to its basis; first a Plan of one sort, and then a Plan of the other sort. There is some Fat betwixt these Fibres, but chiefly towards the basis of the Tongue.

The Vessels of the Tongue are Veins *of its Vessels.* from the Jugulars called *Ranulares*. It has Arteries from the Carotidals, and Nerves from the fifth and ninth Pair.

The Muscles of the Tongue are three *of its Muscles.* Pair.

The *Styloglossus*; it arises fleshy from the *Processus Styloides*, from thence descending; it is inserted into the root of the Tongue; it draws the Tongue upwards.

The

The second Pair is the *Genioglossus*; it arises from the inside of the forepart of the lower Jaw, and is inserted into the root of the Tongue; it pulls the Tongue out of the Mouth.

The third is the *Ceratoglossus*; it arises broad and fleshy from the sides of the *Os Hyoides*, and is inserted into the root of the Tongue; it pulls the Tongue directly into the Mouth. The Fibres of this Muscle, which are nearest the Extremities of the *Os Hyoides* were only called the *Ceratoglossus*, and those which were nearest the basis of the *Os Hyoides* were called the *Basio-glossus*: But I see no reason to distinguish them, being they lie in the same Plan, and their Fibres have the same Direction, Origination, and Insertion.

Of the Os
Hyoides.

The Tongue is not only moved by these Muscles, but also by a Bone called *Os Hyoides*. Now this Bone lies at the root of the Tongue; Its Figure is like the Greek letter υ , it is composed ordinarily of three Bones, that in the middle makes its basis, it is shorter than the other two; it is Convex without, but Concave within; the other two are joined to its two ends, by two intervening Cartilages; they are much longer than the first; they have each a Cartilage at their Extremities, and they are called the *Cornua*, or Horns.

The

The basis of this Bone is joined to the root of the Tongue, and its Horns are joined, by two small and round Ligaments, to the *Processus Styloides* of each side. This Bone is moved, and with it the Tongue by five Pair of Muscles.

The first is the *Geniohyoidens*; it arises fleshy from the forepart of the lower Jaw internally, and is inserted into the basis of the *Os Hyoides*. It pulls the *Os Hyoides* and the Tongue upwards and forwards. Of its Muscles.

Its Antagonist is the *Sternohyoidens*; it arises from the inside of the *Clavicula* and upper Part of the *Sternum*, and ascending above the *Sternotheroidens*, it's inserted into the basis of the *Os Hyoides*, which it pulls downwards.

The third is the *Mylohyoidens*; it arises fleshy from the inside of the lower Jaw, under the *Dentes Molares*, and is implanted into the sides of the basis of the *Os Hyoides*. It draweth this Bone and Tongue obliquely upwards.

Its Antagonist is the *Coracohyoidens*; it is wrong named, for it arises not from the *Processus Coracoides*; but from the upper edge of the *Scapula*, near its Neck, and ascending obliquely, under the *Mastoidens*, it is inserted

serted into the *Os Hyoides*, which it pulls obliquely downwards. The Belly of this Muscle is a little tendinous in its middle, that the Vessels, which go to the Head, be not compressed when it acteth.

The fifth Pair is the *Stylohyoidæus*; it arises from the *Processus Styloides*, and descending obliquely, is inserted into the Horns of the *Os Hyoides*, which it draws to one side, and a little upwards.

The Belly of this Muscle is perforated for the Passage of the Tendon in the middle of the *Digastricus*.

C H A P. V.

Of the Bones.

S E C T. I.

Of the Bones in general.

THo' after the Description of the three Cavities, it is usual to give the Myology; yet because it cannot be understood without a perfect Knowledge of the Bones; therefore we shall begin with them.

The Bones are made up of hard Fibres, tied to one another by small transverse Fibres, as those of the Muscles are. In a *Fœtus* those Fibres are porous, soft, and easily discerned. It is probable that they are nourished by the Serous or Lymphatick Part of the Blood, which is brought to them by the Arteries, and carried back by the Veins. As their Pores fill, with a Substance of their own Nature, such as we suppose the *Lympha* to be, so they encrease, harden, and grow close to one another; but when their Pores are full of this Substance, then the Bones are grown to their outmost extent,

Of the Nourishment of the Bones.

extent, hardness, and solidity, their Blood-Vessels being compressed on all sides by their bony Channels, bringing no more Blood than what is sufficient to supply the places of their decaying Particles.

*Of the Use of
the Marrow.*

All the Bones of the Body, which have any considerable thickness, have either a large Cavity, or they are Spongy, and full of little Cells, in both the one and the other, there is an oleaginous Substance called Marrow, contained in proper Vesicles or Membranes, which is separate from the Nourishment of the Bones, that they may harden; for as soon as the Marrow appears the Bones turn firm and solid, but is still continued in the Cavity and little Cells to supple the Fibres of the Bones, that they may be less apt to break.

All the Bones of the Body, except the Teeth, and those of the Ear, and where the Bones are articulate to one another, are covered with a thin, but close and strong Membrane called *Periosteum*; it has an exquisite sense, which gives me ground to think, that it is an Expansion of some of the tendinous Fibres of the Muscles. Its use is to sustain the Vessels, which enter the Substance of the Bones with their Nourishment.

On

On the external Surface of the Bones there are several Cavities and Protuberances. The Cavities are of two sorts, either narrow and shallow, or wide and deep. The first sort is called *Glene*; the second *Cotyle*. But in describing the Bones in particular, we shall also describe their Cavities. The Protuberances are also of two sorts, viz. *Apophisis* and *Epiphisis*. The *Apophisis* is a Protuberance made by the Fibres of the Bone, produced above its Superficies, and *Epiphisis* is a Protuberance made by a small Bone set upon a bigger Bone, which as we advance in Age, unite in one. Both the one and the other are ordinarily upon the Extremities of the Bones, and they are either for the Insertions of Muscles whose force they greatly augment, or for the Articulation of the Bones. All their difference is from their Figure. If it be a large and round Protuberance, it is called *Caput*, and the Part immediately under it, *Cervix*; but if it be small and round, then it is called *Condylus*. If it be a sharp Protuberance, then it is called *Corone*, *Styloides*, *Coracoides*, &c. according to its Figure.

Of the Cavities and Protuberances of the Bones.

In the Bones there is much volatile Salt and Spirit, which are very subtile and penetrating, some Sulphur which is very stinking, a little Phlegm, and much Earth.

Analysis of the Bones.

S E C T.

S E C T. II.

*Of the Cartilages and Ligaments
in general.*

A Cartilage is a smooth and solid Body, softer than a Bone, but harder than a Ligament. In it there are no Cavities nor Cells, for containing of Marrow, nor is it covered with any Membrane to make it sensible, as the Bones are. The Cartilages have all a natural resort, by which, if they are forced from their Natural figure or situation, they return to it of themselves, as soon as the force is taken away. They are chiefly in those places where a small and easie motion is required, as in the Ears, Nose, *Larynx*, *Trachea Arteria*, and *Sternum*; and their Natural Elasticity serves instead of Antagonist Muscles. They cover also the ends of all the Bones, which are joined together for motion. First, Because they are smoother than the Bones. Secondly, Because they are without sense. And Thirdly, Being softer than the Bones, the Attrition which is made by the motion of the Joint, is the more easily supplied.

A Ligament is a white and solid Body, softer than a Cartilage, but harder than a Membrane; they have no conspicuous

spicuous Cavities, neither have they any sense, lest they should always suffer upon the motion of the Joint. Their chief use is to fasten the Bones, which are articulated for motion together, lest they should be dislocated in any violent motion.

S E C T. III.

Of the Articulations of the Bones.

THE Bones are articulated to one another two ways. The First, Of the joining of the Bones. which is called *Diarthrosis*, is when the Articulation is with a manifest motion. The Second is when the Articulation is without motion, and it is called *Synarthrosis*.

There are three sorts of the *Diarthrosis*, viz. *Enarthrosis*, *Arthrodia*, and *Ginglimus*. The *Enarthrosis* is when a large Head is received into a deep Cavity, such as the Articulation of the *Femur* with the *Ischium*; and this sort of joining is called by Tradesmen, the Ball and Socket, which is used in large Mathematical Instruments, for the turning of the n to any side. *Arthrodia* is when a small Head is received into a shallow *Sinus*, as the *Radius* receives the *Humerus*. Tho' Authors have accounted the *Enarthrosis* and the *Arthrodia* as two distinct Articulations, yet

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yet we see no reason why they should be so; for as they say, *Majus & Minus non variant speciem.* The *Ginglimus* is when a Bone both receives and is received; and this sort of Articulation admits only of the motions of Flexion and Extension; and it is called by Tradesmen *Charnall*, and it is commonly used in hinges. Of this Articulation there are three sorts. The first is when the end of a Bone has two Protuberances and one Cavity, and the end of the Bone which is articulated with it has two Cavities and one Protuberance, as the *Humerus* and the *Ulna*; or when a Bone at one Extremity receives another Bone, and at its other Extremity it is received by the same Bone, as the *Radius* and *Ulna*. The second sort is when a Bone at one end receives another Bone, and at the other end it is received by a third Bone, as the *Vertebra* do. The third is when a Bone has a Cavity which receives the long Process of another Bone, which Process turns in the Cavity, like the Axle-tree in a Wheel. As the second *Vertebra* of the Neck is articulated with the first; but this is no true *Ginglimus*.

The second sort of Articulation called *Synarthrosis* is of two sorts, viz.
Sutura

Sutura and *Gomphosis*. The *Sutura* is when two Bones are mutually indented in one another; the Teeth by which they are indented are of various Figures, sometimes they are like the Teeth of a Saw; sometimes they are broad at their Extremities and narrow at their Basis; sometimes the sides of the Teeth are likewise indented, and sometimes there are little Bones between the Teeth which are also indented; these are most frequently in the *Sutura Lambdoidalis*, and they serve as wedges to keep the Teeth firm. Besides these little Bones, there is ordinarily a viscous Humour which glews the Indentations together, and which perfectly unites them in several old Persons.

This sort of Articulation is called by Joiners *Dustelling*, and is used in Drawers, Cabinets, and Boxes. All the Bones of the *Cranium* and upper Jaw, as also all the *Epiphyses* of the Bones are joined by this sort of Articulation.

Gomphosis is when one Bone is fastened in another, as a Pin or Nail is in a piece of Wood, and the Teeth only are articulated this way in their Sockets. Authors add a third sort of *Synarthrosis*, which they call *Harmonia*, and by it, they say, the Bones

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Bones of the upper Jaw are joined to one another, but these Bones are joined to one another by a true *Suture*.

There is still another way by which Bones are united, which Authors call *Symphisis*, which signifies a natural growing together of the Bones. And this is either with some intervening Substance or without it. The intervening Substance is either a Cartilage, Ligament, or Flesh. If it be a Cartilage, then it is called *Synchondrosis* in this way the union of the *Os Pubis* and of the Bodies of the *Vertebrae* is performed, because this union remains always Cartilaginous. But the *Synchondrosis* of the Chin is nothing but the Fibres of the lower Jaw at the Chin not as yet ossified. If it be a Ligament, then it is called *Syneurosis* and there are none united this way but the *Os Hyoides* to the *Processus Styloides*, and the Extremity of the *Ulna* to the Bones of the *Carpus*. If it be Flesh, then it is called *Syssarcosis*; this way, they say, the *Os Hyoides* and the *Scapula* are united. But who sees not that the Muscles are not for their Articulation, but merely for their motion; and it seems to be more proper to say that the Bones are separated rather than articulated by the inter-

venim

vening Muscles. The other sort of *Symphisis*, which is when the Bones grow together, without any intervening Substance, is nothing but Part of the Bones not quite ossified.

The Extremities of all the Bones in the Body that are articulated to one another for motion, except those of the Ear, are covered with smooth and soft Cartilages, which greatly facilitate their motion: They are also surrounded with Membranes or Ligaments which commonly rise from the Conjunction of the *Epiphyses* and the Bones: These Ligaments serve not only to strengthen the Joinings, and to keep the Heads of the Bones in their Cavities; but it is probable that they have also Glands which separate that Mucilage which is always found in the Joints, and which is as useful to them as Tallow is to Coach Wheels.

S E C T. IV.

Of the Bones of the Cranium.

THE *Cranium* or Skull is made up of several pieces, which being joined together, form a considerable Cavity, which contains the Brain as in a Box.

The bigness of the *Cranium* is proportionate to the bigness of the Brain.

Its

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Its Figure is round, a little depressed on its sides. A round figure being the most capacious, was fittest to contain a great quantity of Brains. And the flatness of its sides, help to enlarge the Sight and Hearing.

Each Bone in the *Cranium* is made up of two Tables or *Lamina*, between which there is a thin and spongiouse Substance, made of some bony Fibres which come from each *Lamina*, called in Greek *Diploe*, in Latin *Meditullium*.

In it there are a great number of Veins and Arteries, which bring blood for the Nourishment of the Bones. The Tables are hard and solid, because in them the Fibres of the Bones are close to one another. The *Diploe* is soft, because the bony Fibres are at a greater distance from one another. By this contrivance, the *Cranium* is not only made lighter, but also less Subject to be broken.

The external *Lamina* is smooth, and covered with the *Pericranium*. The internal is likewise smooth; but on it there are several furrows made by the pulse of the Arteries of the *Dura Mater*, whilst the *Cranium* was soft and yielding.

The Bones of the *Cranium* are joined to one another by four Sutures. The first is called the *Coronalis*. It reaches trans-

*Of the Sutura
Coronalis,*

Of the Bones of the Cranium. 193

transversly from one Temple to the other; it joins the *Os frontis*, with the *Ossa Parietalia*. The second is called *Lambdoidalis*, because it resembles the Greek letter Λ *Lambda*; it joins the *Os Occipitis* to the *Ossa Parietalia* and *Petrofa*. The third is called *Sagittalis*; it begins at the top of the *Lambdoidalis*, and runs straight to the middle of the *Coronalis*; it joins the two *Ossa Parietalia* together. The fourth is called *Sutura Squamosa*, because the Parts of these Bones which are joined by this Suture slope, being mittered together.

Lambdoidalis, Sagittalis and Squamosa.

This Suture joins the Semicircular circumference of the *Ossa Temporum* to the *Os Sphenoides Occipitis*, and to the *Ossa Parietalia*. The first three Sutures were called *Sutura Verae*, and the last *Sutura Falsa*, because it was supposed to have no Indentations, which is false.

The Bones of the *Cranium* are not only joined to one another, but they are also joined to the Bones of the upper Jaw, by three other Sutures. The first is the *Transversalis*, it runs across the Face, it passes from the little Angle of the Eyedown to the bottom of the Orbit, and up again by the great Angle of the Eye over the root of the Noie, and so to the little Angle

Of the Sutura Transversalis, Ethmoidalis, and Sphenoidalis.

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of the Eye, in the other side. It separates the *Os Frontis* from the Bones of the upper Jaw. The second is the *Ethmoidalis*, it surrounds the Bone of that Name, and separates it from the Bones which are about it. The third is the *Sutura Sphenoidalis*, it surrounds the *Os Sphenoides*, separates it from the *Os Occipitis*, from the *Ossa Petrosa*, and from the *Os Frontis*.

The *Cranium* is made of several pieces, joined together by Sutures, that it might be the stronger, and less apt to break, that several Membranes and Vessels, which suspend the *Dura Mater*, and which go to the *Pericranium*, may pass thorow the Sutures, and that the Matter of transpiration may pass thorow them.

*Of the Bones
of the Skull.*

Now the Bones of the *Cranium* are six proper, and two common to it and the upper Jaw. The six proper are, the *Os Frontis*, which makes the fore-part of the Skull; the *Os Occipitis*, which makes the hind-part; and the *Ossa Parietalia* and *Temporum*, which make the sides. The two common are, the *Sphenoides* and the *Os Ethmoides*, which are Part of the basis of the Skull.

Os Frontis.

The first of the Proper, is the *Os Frontis* or *Coronale*; it is almost round, it joins the Bones of the *Sinciput*, and temple

temples by the Coronal Suture, and the Bones of the upper Jaw by the *Sutura Transversalis*, and the *Os Sphenoides* by the *Sutura Sphenoidalis*. It forms the upper Part of the Orbit, and it has four *Apophyses* which are at the four Angles of the two Orbits. It has two holes above the Orbits thorow which pass a Vein, Artery, and some twigs of the first branch of the fifth Pair of Nerves. It has also one in each Orbit a little above the *Os Planum*, thorow which a twig of the Ophthalmick branch of the fifth Pair passes to the Nose, it is the *Orbiter Internus*. It has two *Sinus's* above the Eye-brows, between its two Tables; they are lined with a thin Membrane, in which there are several Blood-Vessels and Glands, which separate a mucous Serosity, which falls into the Nostrils. The inside of this Bone has several Inequalities, made by the Vessels of the *Dura Mater*. It has two large dimples, made by the anterior Lobes of the Brain. Above the *Crista Galli* it has a small blind hole, into which the end of the *Sinus Longitudinalis* is inserted. From this hole it has a pretty large Spine which runs up along its middle; instead of this Spine, there is sometimes a *Sinus*, in which lies the *Sinus Longitudinalis*, which ought to be obser-

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ved carefully by Surgeons in Wounds of this place. This Bone is thicker than the *Sinciput* Bones, but thinner than the *Os Occipitis*. In Children it is always divided in its middle by a true Suture.

Ossa Parietalia.

The second and third are the Bones of the *Sinciput* called *Parietalia*; they are the thinnest Bones of the *Cranium*, they are almost Square, somewhat long, they are joined to the *Os Frontis*, by the *Sutura Coronalis*, to one another in the Crown of the Head by the *Sutura Sagittalis*, to the *Os Occipitis* by the *Lamboidalis*, and to the *Ossa Temporum* by the *Sutura Squamosa*. They are smooth and equal on their outside, but on their inside they have several furrows, made by the Pulse of the Arteries of the *Dura Mater*. They have each a small hole near the *Sutura Sagittalis*, thorow which there pass some Veins which carry the Blood from the Teguments to the *Sinus Longitudinalis*.

Ossa Temporum.

The fifth and sixth are the *Ossa Temporum*, situated in the lower Part of the sides of the *Cranium*; their upper Part, which is thin, consisting only of one Table, is of a circular Figure, and is joined to the *Ossa Parietalia* by the *Sutura Squamosa*; their lower Part, which is thick, hard, and unequal, is joined to the *Os Occipitis* and to the

Os

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Os Sphenoides, this Part is called *Os Petrosum*; they have each three External *Apophyses* or Processes, and one Internal. The first of the External is the *Processus Zygomaticus*, which runs forwards and unites with the Process of the *Os Mali*, making that Bridge called the *Zygoma*, under which lies the Tendon of the Crotaphite Muscle. The second is the *Mammillaris*, or *Mastoides*; it is short and thick, situated behind the *Meatus Auditorius*. The third is the *Processus Styloformis*, which is long and small; to it the Horns of the *Os Hyoides* are tied. The Internal Process is pretty long and big in the basis of the Skull, it contains all the Cavities and little Bones of the Ear, which have been already described. The holes in the Temporal Bones are two Internal and four External. The first of the Internal, is the hole thorow which the Auditory Nerve passes, the second is common to it and the *Os Occipitis*; the eighth Pair of Nerves, and the Lateral *Sinus*'s pass thorow it. The first of the External holes is the *Meatus Auditorius Externus*; the second is opened behind the Palate; it is the end of that Passage which comes from the Barrel of the Ear to the Mouth. The third is the Orifice of the Conduit by which the Carotidale Arteries enter the

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Cranium, and the fourth is behind the *Processus Mastoideus*; by it passes a Vein which carries the Blood from the External Teguments to the Lateral *Sinus's*. Sometimes this hole is wanting; there is another which is between the *Processus Mastoideus* and the *Styliformis*, thorow which the *Portio Dura* of the Auditory Nerve passes. They have each a *Sinus* lined with a Cartilage under the *Meatus Auditorius*, which receives the condyle of the lower Jaw.

Os Occipitis.

The sixth Bone of the *Cranium* is the *Os Occipitis*; it lies in the hind part of the Head; it is almost like a Lozenge with its lower Angle turned inwards, it joins the *Ossa Parietalia* and *Petrosa* by the *Sutura Lambdoidalis*, and the *Os Sphenoides* by the *Sphenoidalis*. It is thicker than any of the other Bones of the *Cranium*, yet it is very thin where the *Splenius*, *Complexus* and *Trapezius* are inserted. Externally it is rough, internally it has two *Sinus's*, in which lie the two Protuberances of the *Cerebellum*, and two large furrows in which lie the *Sinus Laterales*. It has seven holes; the first two are common to it and the *Ossa Petrosa*, the Lateral *Sinus's*, and the *Par Vagus*, pass thorow them. The third is the great hole thorow which the *Medulla Spinalis* passes. The fourth and fifth are the

the holes, thorow which the ninth Pair of Nerves passes. The sixth and seventh are two holes, thorow which there pass two Veins, which bring the Blood from the External Teguments to the *Sinus Laterales*; sometimes there is but one, and sometimes none of these two; there are sometimes two more thorow which the Vertebral Veins pass. This Bone has also two *Apophyses*, one on each side of the great hole; they are lined with a Cartilage, and articulated with the first Vertebra of the Neck. It has also a small Protuberance in its middle, from which there goes a small Ligament, which is inserted into the first Vertebra of the Neck. It is longer in Beasts than in Men.

Os Sphæ-
noides.

The first of the Bones common to the Skull and upper Jaw is the *Sphæ-noides*. It is a Bone of a very irregular figure. It is situated in the middle of the basis of the Skull. It is joined to all the Bones of the *Cranium* by the *Sutura Sphenoidalis*, except in the middle of its sides, where it is continued to the *Ossa Petrosa* as they were one Bone. On its outside it has five *Apophyses*. The first two are broad and thin like a Bat's Wings, they are called *Pterigoides*; they have each a pretty long *Sinus*, from which the Muscles called *Pterigoidæi* arise, and at their

lower end they have each a small hook like a Process, upon which the *Peristaphilinus Externus* turns its Tendon. The third and fourth make the Internal and lower Part of the Orbit; and the fifth is a little *Apophise* like the *Crista Galli* in its forepart, which is received in a Cavity at the further end of the *Vomer*. There is also a little small Protuberance in the middle of this Bone, from which the Muscles of the *Uvula* arise. On its inside it has four Processes called *Clinoides*; they form a Cavity in the middle of this Bone called *Cella Turcica*, in which lies the *Glandula Pituitaria*. Betwixt the two Tables of this Bone, under the *Cella Turcica* there is a *Sinus*, divided in two in its middle, which opens by two holes into the Cavity of the Nostrils. In the *Os Sphenoides* there are twelve holes; by the first and second pass the Optick Nerves; by the third and fourth, which are called *Foramina Lacera*, pass the third Pair, fourth Pair, first branch of the fifth Pair, and the sixth Pair; by the fifth and sixth pass the second branch of the fifth Pair; by the seventh and eighth pass the third branch of the same Pair; by the ninth and tenth enter the Arteries of the *Dura Mater*; and by the eleventh and twelfth enter the Internal Carotidales, and

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and the Intercostal Nerve goes out. The Canal by which the Carotidales enter are oblique, the beginning of them is made in the *Ossa Petrosa*, and they open within the Skull in the *Sphenoides*.

The second and last of the common Bones is the *Os Ethmoides*, situated in the middle of the basis of the *Os Frontis*, joined to that Bone and to the *Os Sphenoides* by the *Sutura Ethmoidalis*. In its middle it has a small Process called *Crista Galli*, to which the fore-end of the *Falx* is tied. This Bone is perforated by a number of small holes, thorough which the Fibres of the Olfactory Nerve pass; therefore it is also called *Os Cribriforme*. From its under side there goes a thin Bone, which divides the Cavity of the Nostrils in two; the lower edge of this Bone is Grouved with the *Vomer*. On each side of this Partition it has several thin spongy *Lamine*, called *Ossa Spongiosa*, they are full of little Cells, where they are joined to the *Ethmoides*. There are two *Laminae* which neither adhere to the *Os Ethmoides*, nor to the other *Lamina*, but only by the Membrane which covers them all. These two were first observed by Moni. du Verney. The two External *Lamine* of the *Ossa Spongiosa*, make Part of the

Os Ethmoides.

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Orbit at the great *Canthus*, and they are called *Ossa Plana*, because they are smooth and even.

S E C T. V.

Of the Bones of the Upper Jaw.

THE Bones of the Upper Jaw are two common to it and the Skull, which have been already described, and eleven Proper, that is five in each side, and one in the middle; they are joined to the Bones of the Skull by the three common Sutures, and joined to one another by a fine but true Suture.

Os Mali.

The First of the Proper Bones is the *Os Mali* or *Zygoma*; it is of a triangular Figure. Its upper side makes the lower and external Part of the circumference of the Orbit, where it joins the *Os Sphenoides*. Its Internal side joins the *Os Maxillare*. Its External has a long Process, which joining that of the *Ossa Temporum* forms the *Processus Zygomaticus*; it joins the *Os Frontis* at the little Angle of the Eye. It is Concave within, and it sticks out a little forwards making the highest Part of the Cheek.

Os Maxillare.

The Second is the *Os Maximum* or *Maxillare*, because in it all the Teeth of the Upper Jaw are set. It is of a very irregular Figure. On its outside it joins

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joins the *Os Mali*. Its upper side makes the lower and Internal circumference of the Orbit. At its great *Canthus* it joins the *Os Unguis* and *Frontis*. The lower side of the *Os Nasi* is joined to it. Under the upper Lip it joins with its fellow of the other side, and both joined together make the fore and greatest Part of the Roof of the Mouth. It is very thin, and between its two *Laminae* it has a large Cavity which opens by a small hole into the Nostrils. In its lower end it has sixteen *Sinus's* or Sockets, in which the Teeth are set. It has a small hole called *Orbiter Externus*, in that Part of it which makes Part of the Orbit; and a little under this in its middle, it has another, thorow which the Nerves of the fifth Pair which come from the Teeth pass. Behind the *Dentes Incisivi*, where it joins with its fellow it has another which comes from the Nostrils.

The Third is the *Os Unguis*, it is a *Os Unguis*, little thin Bone which lies in the great Angle of the Orbit, it has a hole in which the Lachrymal Sack lies. I see no reason why this Bone should be counted a Bone of the Upper Jaw, being it lies entirely in the great Angle of the Orbit; there is more reason to count it a *Lamina* of the *Os Spongiosum* as the *Os Planum*.

The

Os Nasi.

The Fourth is the *Os Nasi*; this is a thin but solid Bone, which makes the upper Part of the Nose; its upper end is joined to the *Os Frontis* by the *Sutura Transversalis*: One of its sides joins its fellow, and its lower is joined to the *Os Maxillare*. Upon its lower end the Cartilages of the Nostrils are fastened. Externally it is smooth, but Internally it is rough.

Os Palati.

The Fifth Bone of the Upper Jaw is the *Os Palati*; it is a small Bone almost square, it makes the Posterior Part of the Roof of the Mouth. It is joined to that Part of the *Os Maxillare* which makes the forepart of the Palate. It is also joined to its fellow and to the *Processus Pterigoidens*. It has a small hole thorow which a branch of the fifth goes to the Membrane of the Palate.

Vomer.

The Eleventh and Last is called the *Vomer*, it is situated in the middle of the lower Part of the Nose. It has a cleft in its upper side, in which cleft it receives the lower edge of the *Sep-tum Nasi*. In its further end it receives a small *Apophise* of the *Os Sphenoides*, and its under side the *Os Palati*.

By what has been said you see that the Bones of the Skull and Upper Jaw compose the Orbit of the Eye. The upper Part of it is made of the *Os Frontis*;

Frontis; the *Os Unguis*, and *Os Planum* make the inner and lower Part of the great Angle; and the *Os Sphenoides* the inner and lower of the little Angle. The *Os Maxillare* makes the inner and lower Part of the Circumference, and the *Os Mali* the outer and lower Part.

Let us now briefly Recapitulate all the holes in the Head. They are either External or Internal. The External holes are, 1. The two in the Coronal Bone above the Orbit thorow which a Vein, Artery and a Nerve from the Ophthalmick branch of the fifth Pair passes for the brow and frontal Muscles. 2. The *Orbiter Internus* in the same Bone within the Orbit a little above the *Os Planum*, for another branch of the fifth Pair of Nerves which goes to the Nose. 3. Is between the *Os Unguis* and the *Os Maxillare*, in the great *Canthus*, thorow which the *Ductus Lachrymalis* passes to the Nose. 4. *Orbiter Externus* in the *Os Maxillare* below the Orbit, thorow which the Nerves and Vessels which come from the Teeth pass to the Cheek. 5. One single hole in the same Bone behind the fore Teeth which comes from the Nose. 6. Two in the *Ossa Palati* thorow which a branch of the fifth Pair of Nerves passes to the
Palate,

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Palate, *Uvula* and Gums. 7. In the Temporal Bone between the *Processus Mastoideus* and *Styliformis*, thorow which the *Portio Dura* of the Auditory Nerve passes. 8. The *Ductus Auditorius Externus*. 9. The *Ductus Auditorius Internus*. 10. The Conduit for the Carotidale Artery. 11. In the same Bone thorow which a Vein passes from the External Teguments to the Lateral Sinus's; this is behind the *Processus Mastoideus*. 12. In the Occipital Bone behind its *Apophyses* thorow which the Vertebral Veins pass. 13. In the same Bone for a branch of the External Jugular. 14. One single large hole for the *Medulla Spinalis*.

The Internal holes are, 1. The blind hole above the *Crista Galli*. 2. The holes in the *Os Ethmoides*. 3. In the *Os Sphenoides* for the Optick Nerves. 4. The *Foramen Lacerum*, thorow which the 3, 4, first branch of the fifth and sixth Pair of Nerves pass. 5. For the second branch of the fifth Pair of Nerves. 6. For the third branch of the same Nerve. 7. The *Foramen Arteriae durae Matris*. 8. The Canall thorow which the Carotidale enters, and the Intercoastal passes out, but this we counted amongst the External holes. 9. In the Process of the *Os Temporum* thorow the Auditory Nerve passes,

passes, 10. Between the Temporal and Occipital Bones, it is divided in two by the *Dura Mater*, thorow the one Part passes the eighth Pair of Nerves and the *Nervus Accessorius*; thorow the other the Lateral *Sinus's* open into the Internal Jugulars. 11. One in each side of the large hole in the *Occiput*, thorow which the ninth Pair of Nerves go out.

S E C T. VI.

Of the Lower Jaw.

THE Lower Jaw is made of one Bone whose Fibres at the Chin, in Children do not ossifie till they are about two Years old. It is composed of two Tables, which are pretty hard and smooth; but betwixt these two *Lamine* it is porous and full of little Cavities; its figure resembles the letter *v*; at each Extremity it has two Processes, the uppermost is called *Corone*; it is thin and broad at its beginning, but it ends in a sharp Point, which passing under the *Processus Zygomaticus*, has the Tendon of the Crotaphite muscle inserted into it. The other which is shorter and lower has a round Head, lined with a Cartilage, which is articulated into the *Sinus* of the *Os Petrosus*; but betwixt the Cartilage which
lines

lines the *Sinus*, and that which covers the Head of this Process there is a third, which adheres to the *Ligamentum Annulare* which surrounds this Articulation. The Motion of the Jaw sideways, which is absolutely necessary in chewing, is much facilitated by this loose intervening Cartilage. The lower edge of this Jaw is called its basis, each end of which is called the Angle of the Lower Jaw.

The Lower Jaw has four holes, two on its inside near its Processes, and two on its outside near its middle. By the Internal holes enter a branch of the fifth Pair of Nerves, a Vein from the Jugulars, and an Artery from the Carotidales, which give twigs to the roots of the Teeth. By the External holes these same Vessels come out, and are distributed upon the Chin. It has also Sixteen *Sinus's* into which the Teeth are set.

SECT. VII.

Of the Teeth.

Of the Substance of the Teeth.

THE Teeth are the hardest and smoothest Bones of the Body; they are formed in the Cavities of the Jaws, which are lined with a thin Membrane, upon which there are several Vessels, thorow which there passes

a thick, viscous, transparent Humour, which, as it encreases, hardens in the form of Teeth, which about the seventh or eighth Month after Birth, begin to pierce the edge of the Jaw, tear the *Periosteum* and Gums, which being very sensible create a violent Pain and other Symptoms incident to Children in the time of teething.

The Teeth begin not to appear all at one time ; First the *Dentes Incisivi* of the Upper and then those of the Lower Jaw appear, because they are the thinnest and sharpest. After them come those of the *Canini*, because they are sharper than the *Molares*, but thicker than the *Incisivi* ; and last of all the *Molares*, because they are the thickest and bluntest. Of this viscous transparent Liquor which is the Substance of the Teeth, there are two Lays, the one below the other, divided by the same Membrane which covers all the Cavity of the Jaw ; the uppermost Lay forms the Teeth which come out first, but about the Seventh year of Age, they are thrust out by the Teeth made of the undermost Lay, which then begin to sprout ; and if these Teeth be lost, they never grow again ; but if some have been observed to cast their Teeth twice, they have had three Lays of this viscous Humour. About the one and twentieth

twentieth Year, the two last of the *Molares* spring up, and they are called *Dentes Sapiaentia*.

Of the Dentes
Incisivi.

The Teeth, which are sometimes fourteen, sometimes fifteen, and sometimes sixteen in each Jaw, are of three sorts; the *Dentes Incisivi*, *Canini*, and *Molares*. The *Incisivi* are the four foremost Teeth in each Jaw, they are pretty broad, sharp at their ends, a little convex outwards, and hollow inwards; they have each a pretty long root, a little crooked, and divided into two, by which means they have the greater force in cutting off the Aliments, which is their proper use. The

Canini.

Canini are two in each Jaw, one on each side of the *Incisivi*; they are pretty thick and round, and they end in a sharp Point; they have each one root which is longer than the roots of the *Incisivi*; their proper use is to pierce the Aliments. The *Molares* ordinarily

Molares.

are ten in each Jaw; they are the thickest and biggest of the Teeth; their Extremities are broad and uneven; they have sometimes two, sometimes three, and sometimes four roots which separate a little from one another, that they having a broad basis they may find the greater resistance from the Jaw when they press upon one another in chewing of the Aliments; and the

Of the Spine and Vertebrae. 211

the pressure has the less force, being the roots are a little crooked outwards, and not in a straight line under the pressure. The last of the *Molares* are the biggest and hardest, because we ordinarily thrust the hardest Bodies furthest into our Mouth; they are highest the Articulation, because their use, which is to grind the Aliments small, requires the greatest strength. The Roots of the Teeth of the Upper Jaw are all somewhat larger than those of the Under Jaw, because the Upper Jaw is not so strong to resist the pressure of the Teeth as the Lower is.

S E C T. VIII.

Of the Spine and Vertebrae.

BY the Spine we understand that chain of Bones which reaches from the first Vertebra of the Neck to the *Os Coccygis*; they are thirty in number, seven *Vertebra* of the Neck, twelve of the Back, five of the Loins, and six of the *Os Sacrum*; they lie not in a straight line, for those of the Neck bend inwards, those of the Back outwards for enlarging the Cavity of the *Thorax*; those of the Loins bend inwards again, and those of the *Os Sacrum* outwards, to enlarge the Cavity of the Basin.

*The Number of
the Vertebrae.*

In

The Parts of
the Vertebrae.

In each *Vertebra* we distinguish two Parts, the Body of the *Vertebra* and its Processes; the Body is softer and more spongy than the Processes which are harder and more solid. The forepart of the Body is round and Convex; the hindpart somewhat Concave; its upper and lower sides are plain, each covered with a Cartilage, which is pretty thick forwards, but thin backwards, by which means we bend our Body forwards; for the Cartilages yield to the pressure of the Bodies of the *Vertebrae*, which in that motion come closer to one another. This could not be effected, if the harder Bodies of the *Vertebrae* were close to one another. Each *Vertebra* has three sorts of Processes towards its hinder part, two transverse or lateral, one on each side; they are nearer the Body of the *Vertebra* than the rest. In each of them there is a Tendon of the Vertebral Muscles inserted. Four oblique Processes, two on the upper Part and two on the lower, by these the *Vertebrae* are articulated to one another; and one acute on the hindmost Part of the *Vertebra*.

These Processes with the hinder or concave Part of the Body of the *Vertebra*, form a large hole for the descent of the Spinal Marrow. Besides this hole, there are two small holes on their upper
sides,

sides, and two on their under sides for the Passage of the Spinal Nerves; these holes as made by two *Sinus's* on the under side of the Superior *Vertebra*, and two *Sinus's* on the upper side of the Inferior *Vertebra*, which answering the former *Sinus* form these holes.

The *Vertebrae* are articulated to one another by a *Ginglimus*, for the two descending oblique Processes of each Superior *Vertebra* of the Neck and Back have a little dimple in their Extremities, wherein they receive the Extremities of the two ascending oblique Processes of the Inferior *Vertebra*; so that the two ascending Processes of each *Vertebra* of the Neck and Back are received, and the two descending do receive, except the first of the Neck and last of the Back; but the ascending Processes of each *Vertebra* of the Loins receive, and the two descending are received contrary to those of the Neck and Back.

Of the Articulation of the Vertebrae.

The *Vertebrae* are all tied together by a hard Membrane, made of strong and large Fibres, it covers the Body of all the *Vertebrae* forwards, reaching from the first of the Neck to the *Oss Sacrum*; there is another Membrane which lines the Canal, made by the large hole of each *Vertebra*, which also ties them all together. Besides the Bodies

Bodies of each *Vertebra* are tied to once another by the intervening Cartilages and the Tendons of the Muscles, which are inserted in their Processes, tie them together behind.

Of the Vertebrae of the Neck.

The seven *Vertebra* of the Neck differ from the rest in this, that they are smaller and harder. Secondly, That their transverse Processes are perforated for the Passage of the vertebral Vessels. Thirdly, That their acute Processes are forked and straight; but besides this, the first and second have something peculiar to themselves.

Atlas.

The First, which is called *Atlas*, is tied to the Head, and moves with it upon the Second semi-circularly; its ascending oblique Processes receive the Tubercles of the *Occiput*, upon which Articulation the Head is only bended and extended, and its descending Processes receive the ascending Processes of the second *Vertebra*. It has no acute Process, that it might not hurt the action of the *Musculi Recti*; but a small Tubercle to which the small Ligament of the Head is inserted. In the hindpart of its great hole, it has a pretty large *Sinus*, in which lies the Teeth-like Process of the second *Vertebra*, being fastened by a Ligament that rises from each side of the *Sinus*, that it compresses not the *Medulla Spinalis*.

Of the Spine and Vertebrae.

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alis. It has two small *Sinus's* in its upper Part, in which the tenth Pair of Nerves and the Vertebral Arteries lie.

The Second is called *Epistrophæus* or *Vertebra Dentata*, in the middle between its two oblique ascending Processes; it has a long and round Process like a Tooth which is received into the fore-said *Sinus*, upon it the Head with the first *Vertebra* turns half round as upon an Axis. The Extremity of this Process is knit to the *Occiput* by a small but strong Ligament. A Luxation of this Tooth is mortal, because it compresses the *Medulla Spinalis*.

The Third *Vertebra* is called *Axis*; and the four following have no name, nor any peculiar difference.

The Twelve *Vertebrae* of the Back differ from the rest in this, that they are larger than those of the Neck, and smaller than those of the Loins; their acute Processes slope downwards upon one another: They have in each side of their Bodies a small dimple wherein they receive the round Extremities of the Ribs, and another in their transverse Processes, which receives the little Tubercle near that Extremity of the Ribs. The Articulation of the twelfth with the first of the Loins is by *Arthrodia*, for both its ascending

Epistrophæus

Axis.

Of the Vertebrae of the Back.

ing and descending oblique Processes are received.

Of the Vertebrae of the Loins.

The Five *Vertebrae* of the Loins differ from the rest in this, that they are the broadest and the last of them is the largest of all the *Vertebrae*. Their acute Processes are broader, shorter and wider from one another, their Transverses longer, to support the Bowels, and the Muscles of the Back; they are not perforated as those of the Neck, nor have they a dimple or *Sinus* as those of the Back. The Cartilages which are betwixt their Bodies are thicker than any of the rest.

Of the Os Sacrum.

The Six *Vertebrae* of the *Os Sacrum* grow so close together in Adults as that they make but one large and solid Bone of the figure of an *Isosceles Triangle*, whose basis is tied to the last *Vertebra* of the Loins, and the upper Part of its sides to the *Os Ilia*, and its Point to the *Os Coccygis*. It is Concave and smooth on its fore side, but Convex and unequal on its back side. It hath five holes on each side, but the Nerves pass only thorow the five on its fore side. Its acute Processes or *Spines* are shorter and less than those of the Loins, and the lower is always shorter than the upper.

Os Coccygis.

The *Os Coccygis* is joined to the Extremity of the *Os Sacrum*; it is composed

posed of three or four Bones, of which the lower is still less than the upper, till the last ends in a small Cartilage; it resembles a little tail turned inwards; its use is to sustain the straight Gut; it yields to the pressure of the *Fœtus* in Women in Travail, and Midwives use to thrust it backwards, but sometimes rudely and violently, which is the occasion of great Pain, and of several bad Effects.

From what has been said, it is easie to understand how the Motion of the Back is performed; tho' each particular *Vertebra* has but a very small Motion, yet the Motion of all is very considerable. We have said that the Head moves only backwards and forwards upon the first *Vertebra*, and Semi-circularly upon the second. The small Protuberance which we have remarked in the Bone of the hind Head falling upon another in the first *Vertebra* stops the Motion of the Head backwards, that it compress not the Spinal Marrow, and when the Chin touches the *Sternum*, it can move no further forwards. The Oblique or Semicircular Motions are limited by the Ligament which ties the Process of the Second *Vertebra* to the Head, and by those which tie the first to the second *Vertebra*. The Motion of the other *Ver-*
L *tebra*

tebra of the Neck is not so manifest, yet it is greater than that of the *Vertebra* of the Back, because their acute Processes are short and straight, and the Cartilages which are between their Bodies thicker. The twelve *Vertebrae* of the Back have the least Motion of any, because their Cartilages are thin, their acute Processes are long and very near to one another; and they are fixed to the Ribs, which neither move forwards nor backwards. But the greatest Motion of the Back is performed by the *Vertebrae* of the Loins, because their Cartilages are thicker, and their acute Processes are at a greater distance from one another, for the thicker the Cartilages are, the more we may bend our Body forwards; and the greater distance there is betwixt the acute Processes the more we may bend our selves backward.

This is the Structure and Motion of the *Vertebrae* when they are in their natural Position: but we find them also in several persons several ways distorted. If the *Vertebrae* of the Back stick out, such as have this Deformity are said to be bunch-backed, and in such the Cartilages which are between the *Vertebrae*, are very thin and hard forwards, but considerably thick backwards, where the oblique Processes of

the Superior and Inferior *Vertebræ* are at a considerable distance from one another, which distance fills up with a viscus Substance. This inequality of the thickness of the Cartilages happens either by a relaxation, or weakness of the Ligaments and Muscles which are fastened to the backside of the *Vertebra*, in which case their Antagonists finding no opposition, remain in a continual Contraction, and consequently there can be no Motion in these *Vertebræ*. If this Deformity has been from the Womb, then the Bones being at that time soft and tender, the Bodies of the *Vertebræ* partake of the same inequality as the Cartilages. If the bunch be towards one Shoulder for example towards the right, then the Cartilages on that side are very thick, but thin and dry on the other side; on the left side the oblique *Apo-phises* come close together, but on the right there is a considerable distance betwixt them; and the Ligaments and Muscles are greatly extended on the right side, but those on the left are as much contracted. If the *Vertebræ* are distorted inwards, all things have a different Face: The Cartilages and sometimes the *Vertebræ* are very thick forwards, but mighty thin and hard backwards; the acute and oblique Pro-

cesses are very close to one another, and the Ligaments upon the Bodies of the *Vertebrae* are greatly relaxed, but the Muscles and Ligaments which tie the Processes together are very much contracted. These Distortions seldom happen in the *Vertebrae* of the Loins, but such as are so miserable have little or no Motion of their Back.

S E C T. IX.

Of the *Ossa Innominata*.

THE *Ossa Innominata* are two large Bones situated on the sides of the *Os Sacrum*; in a *Fœtus* they may be each separated into three pieces, which in Adults unite and make but one Bone, in which they distinguish three Parts. The first and Superior Part is called *Os Ilium*; the Intestine *Ileum* lieth between it, and its fellow. It is very large, almost of a Semicircular Figure, a little Convex and uneven on its External side, which is called its *Dorsum*, and Concave and smooth on its Internal side, which is called its *Costa*. Its circumference or edge is called its *Spine*. It is joined to the sides of the three Superior *Vertebrae* of the *Os Sacrum* by a true Suture; it is larger in Women than in Men.

The

Of the *Ossa Innominata.*

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The second is the *Os Pubis*, which is Os Pubis.
the inferior and forepart of the *Os Innominatum*, 'tis united to its fellow of the other side by an intervening Cartilage, by which means it makes the forepart of the *Pelvis* or *Basin*, of which the *Os Sacrum* is the back Part, and the *Iliac* the sides.

The third is the Inferior and Posterior Part called *Ischium* or *Coxendix*, it Os Ischium.
has a large Cavity called *Acetabulum* or *Coxendicis*, which receives the head of the Thigh Bone; the circumference of this Cavity is tipped with a Cartilage called its *Supercilium*, where it joins the *Os Pubis*; it has a large hole called *Foramen Ischij & Pubis*, about the circumference of which the Muscles called *Obturator Internus* and *Externus* arise. And at its lowest end it has a large Protuberance upon which we sit, and from whence the benders of the Leg arise. And a little above this, upon its hinder Part it has another small acute Process, betwixt which and the former Protuberance lies the *Sinus* of the *Ischium*, thorow which the Tendon of the *Obturator Internus* passes.

S E C T. X.

Of the Ribs.

Costæ.

THERE are 24 Ribs, twelve on each side of the twelve *Vertebra* of the Back; they are crooked and like to the Segments of circles; they grow flat and broad as they approach the *Sternum*, but the further they are from it, and the nearer they are to the *Vertebra* they are the rounder and thicker, at which end they have a round head, which, being covered with a Cartilage, is received into the *Sinus* in the Bodies of the *Vertebra*, and at the Neck of each Head (except the two last Ribs) there is a small Tubercle, which is also received into the *Sinus* of the transverse Processes of these same *Vertebra*.

The Internal Superficies of the Ribs is smoother than the External; they have each a small Canal or *Sinus*, which runs along their under sides, in which lies a Nerve, Vein, and Artery. The Substance of the Ribs is partly bony, partly cartilaginous, which facilitates their Motion in Respiration. At their cartilaginous end they are tied to the *Sternum*, where they are harder in Women than in Men, that they may the better bear the weight of their Dugs.

The

The Ribs are of two sorts, the seven upper are called *Costæ Vera*, because their Cartilaginous ends are received into the *Sinus's* of the *Sternum*. The five lower are called *Falsæ*, because they are shorter and softer, of which only the first is joined to the Extremity of the *Sternum*, the Cartilaginous Extremities of the rest are tied to one another, thereby leaving greater space for the dilatation of the Stomach and Intrals. The last of these false Ribs is shorter than all the rest; it is not tied to them, but sometimes to the Midriff, and sometimes to the *Musculus Obliquus Descendens*.

The use of the Ribs is to contain and defend the Heart and Lungs, to sustain the Muscles which move them in Respiration.

S E C T. XI.

Of the Breast Bone.

THE *Sternum* or Breast Bone is situated in the middle of the Breast; it is composed of seven or eight Bones in Infants, which at first are Cartilaginous, but which harden and unite into three Bones after they are seven years old; the Substance of these Bones is not solid but somewhat spongyous.

Sternum.

The first and uppermost Bone is the biggest and largest; it is uneven and rough on its outside, but smoother on its inside, where it has a shallow furrow which gives way for the descent of the Wind Pipe. It has a *Sinus* lined with a Cartilage on each side of its upper end, wherein it receives the Heads of the *Claviculae*.

The second is longer and narrower than the first, and on its sides there are several *Sinus's*, in which the Cartilaginous ends of the Ribs are received.

The third is shorter but broader than the second, it receives into the Lateral *Sinus's* the Extremities of the last true Ribs; it terminates into a Cartilage which hardens sometimes into a Bone, called *Cartilago Xiphoides*, or *Ensiformis*, because it is broad at its upper end, where it joins the third Bone, and grows narrower to its Extremity, where it is sometimes forked, and sometimes it bends inwards, compresses the upper Orifice of the Stomach, and causes a great Pain and Vomiting.

The use of the *Sternum* is to defend the Heart, and to receive the Extremities of the true Ribs.

S E C T. XII.

Of the Claviculæ and Scapulæ.

THE *Clavicula* or Channel Bones *Claviculæ*, are two in number, situated at the basis of the Neck, above the Breast, one on each side, they are pretty long and small; at one end they are joined to the Production of the *Scapula*, called *Acromion*, by the Articulation called *Synchondrosis*, at the other end, to the upper end of the *Sternum*, by the Articulation called *Arthrodia*; they are crooked like an Italian *S*, for the Passage of the Vessels which pass under them, and to facilitate the Motion of the Arms.

Their Substance is Spongy, with a Cavity in their middle, therefore they are the more easily broken, and the sooner united when broken; their use is to uphold the Arms, to keep them at a little distance from the *Sternum*; therefore Beasts which make not use of their Hoofs as Hands, have no *Clavicule*, whilst Apes, Rats, and several others, which do use their fore Legs as we do our Hands, have them.

The *Scapula*, *ὀμοπλάτη*, or Shoulder-*Scapulæ* blades, are two large and broad Bones, like the Triangle called *Scalenum*; they

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are situated on each side of the upper and back part of the *Thorax*; their Substance is thin, but solid and firm; their outside is somewhat Convex and their inside Concave; their upper edge is called *Costa Superior*, and their lower *Costa Inferior*; their broad end is called their *Basis*, which, with the two edges, make the upper and lower Angles. They have each three Processes, of which the first runs all along the middle of their outside, and 'tis called their *Spine*. That end of the *Spine* which receives the Extremity of the *Clavicula* is called *Acromion*. The second Process is a little lower than the *Acromion*; 'tis short and sharp like a Crow's Bill, therefore called *Coracoides*; these two Processes are tied to one another by a strong Ligament which serves to keep the Head of the *Humerus*, in the Cavity of the third Process, which is called *Cervix*. This Process is the Extremity of the *Scapula*, which is opposite to its basis. It has a pretty large and round *Sinus*, tipt about its brim with a Cartilage, which makes it the deeper, it receives the head of the *Humerus*.

The use of the *Scapula* is to receive the Extremities of the *Clavicula*, and *Humerus*, for the easier motion of the Arm, and to give a rise to the Muscles which move the Arm.

S E C T.

S E C T. XIII.

Of the Bones of the Arm and Hand.

THE first Bone of the Arm is the *Humerus*, or Shoulder Bone ; 'tis long and round, its Substance or Fibres are pretty solid and compact ; it has a pretty wide and long Cavity in its middle, in which is contained its Marrow. At its upper end it has a round Head covered with a Cartilage, which is received into the Cavity of the Neck of the *Scapula* ; but because this Head is much larger than the Cavity, therefore it is surrounded with a strong Ligament, which rises from the edge of the Cavity of the *Scapula*. At its lower end it has two Protuberances ; the one External, which receives the Extremity of the *Radius* ; the other Internal, which is received into the Semicircular *Sinus* of the *Ulna*. On the foreside of this Protuberance there is a small *Sinus* which receives the fore Process of the *Ulna* ; and on the backside there is another large *Sinus* which receives the *Olecranium*. There is another small Protuberance on the side of this, from which the Muscles that lie on the inside of the Arm arise.

The *Ulna* or *Cubitus*, is a long and solid Bone with a Cavity in its middle.

It

It lies on the inside of the fore Arm, reaching from the Elbow to the Wrist; it is big at its upper end, and grows smaller to its lower end. At its upper end it has two Processes which are received into the fore and hind *Sinuses* of the Extremity of the *Humerus*; the foremost Process is small and short, the hindmost called *Olecranium* is bigger and longer; it stays the fore Arm when it comes to a straight line with the Arm. Betwixt these Processes it has a Semicircular *Sinus*, which receives the inner Protuberance of the lower end of the *Humerus*, upon which we bend and extend our fore Arm.

The inside of this upper end has a small *Sinus* which receives the Circumference of the round Head of the *Radius*. Its lower Extremity which is round and small is received into a *Sinus* in the lower end of the *Radius*, and upon this Extremity it has a short and small Process, from which the Ligaments which tie it to the Bones of the Wrist arise; this Process serves to keep the Bones of the Wrist in their place.

Radius.

The *Radius* is another Bone of the fore Arm, which accompanies the *Ulna* from the Elbow to the Wrist; in its upper end it has a small Cavity which receives the outer Protuberance of the *Humerus*. The Circumference of this Cavity

Cavity rould into the small *Sinus* in the upper end of the *Ulna*. Near its lower end, which is bigger than its upper, it has a little *Sinus* which receives the end of the *Ulna*, and in its Extremity it has two *Sinus's* which receive the Bones of the Wrist. Altho' the *Ulna* and the *Radius* accompany one another, yet they touch not but at their Extremities. They bend from one another in their middle, but they are tied together by a strong and broad membranous Ligament.

The *Ulna* is articulated to the *Humerus* by a *Ginglimus*, which only admits of the motion of Flexion and Extension, to the end that when we lift any great weight, the *Ulna* may not turn to a side, and so avoid the resistance of the weight. But because if the Hand were only confined to this Motion, we could have but little use of it; therefore the Wrist is joined to the *Radius* which performs the Motion of Pronation, and Supination, by which means the hands partake of the Motion of both Bones.

The *Carpus* or Wrist is made up of The Bones of the Carpus. eight little Bones of a different Figure and bigness; they are placed in two ranks, four in each rank. The first rank is articulated with the *Radius*. The second with the Bones of the *Metacarpus*.

Metacarpus. The last little Bone of the first rank lies not at the side of the third, which answers to the Bone of the *Metacarpus* of the little Finger, as all the rest do by one another, but it lies upon it; They are strongly tied together by the Ligaments which come from the *Radius*, and by the annular Ligament, thorow which the Tendons which move the Fingers pass. Altho' this Ligament be thought but one, yet it gives a particular case to every Tendon which passes thorow it.

The Bones of
the Metacar-
pus.

The *Metacarpus* is made up of four Bones which answer the four Fingers; that which sustains the Fore-finger is the biggest and longest; they are round and long, a little Convex and round towards the back of the Hand, and Concave and plain towards the Palm. They are hollow in their middle and full of Marrow; they touch one another only at their Extremities, leaving spaces in their middle, in which lie the *Musculi Interossei*. In their upper end there is a *Sinus* which receives the Bones of the Wrist, and their lower Extremity is round, and is received into the *Sinus* of the first Bones of the Fingers.

The Bones of
the Fingers.

The Bones of the Fingers and Thumb are fifteen in each Hand, three to each Finger; they are a little convex and round

round towards the Back of the Hand, but hollow and plain towards the Palm, except the last where the Nails are. The order of their Disposition is called first, second, and third *Phalanx*. The first is longer than the second, and the second than the third. The upper Extremity of the first Bone of each Finger has a little *Sinus* which receives the round head of the Bones of the *Metacarpus*. The upper Extremity of the second and third Bones of each Finger hath two small *Sinus's* parted by a little Protuberance; and the lower Extremity of the first and second Bones of each Finger has two Protuberances, divided by a small *Sinus*. The two Protuberances are received into the two *Sinus's* of the upper Extremity of the second and third Bones; and the small *Sinus* receives the little Protuberance of the same end of these same Bones. The first Bone of the Thumb is like to the Bones of the *Metacarpus*, and it is joined to the Wrist and second of the Thumb, as they are to the Wrist and first of the Fingers. The second Bone of the Thumb is like the first Bones of the Fingers, and it is joined to the first and third, as they are to the Bones of the *Metacarpus*, and second of the Fingers. The Fingers are moved
side-

Offa Sefamoidæa.

side-ways, only upon their first Joint.

Besides these Bones, there are some small ones called *Offa Sefamoidæa*, because they resemble the Grains of *Sesamum*, they are reckoned about 12 in each Hand; they are placed at the Joints of the Fingers, under the Tendons of the *Flexores Digitorum*, to which they serve as so many Pulleys.

S E C T. XIV.

Of the Bones of the Thighs, Legs, and Feet.

THE Thigh has only one Bone, which is the longest of all the Bones of the Body, its Fibres are close and hard; it has a Cavity in its middle, 'tis a little convex and round on its fore-side, but a little hollow, with a long and small ridge called *Linea Aspera* on its back-side. At its upper end it has three *Epiphyses* which separate easily in Children.

The first is its Extremity, which is a large and round head covered with a Cartilage, which is received into the *Acetabulum Coxendicis*, wherein it is tied by two Ligaments. The first is pretty large, and comes from the edge of the *Acetabulum*. The second is round and short; it comes from the bottom of the *Acetabulum*, and is inserted.

serted in the middle of the round head ; the Part immediately below this round head, which is small, long, and a little Oblique, is called its Neck. It makes an Angle with the Body of the Bone, by which means the Thighs are kept at a distance from one another, that the Muscles on the inside of the Thighs might lie the more conveniently without rubbing upon one another, or hurting of the Privities. Besides this obliquity of the Neck of the Bone conduces much to the strength of the Muscles of the Thigh ; because it removes their Insertions from the Center of Motion.

The second is called *Trochanter major* ; Trochanter major. it is a pretty big Protuberance on the External side of the Thigh Bone, just at the root of the Neck, it is rough, because of the Insertion of some Muscles in it. It has a small dent at its root, into which the *Musculi Quadragemini* and the *Obturatores* are inserted.

The third is called *Trochanter minor* ; Trochanter minor. it is on the hind side of the Thigh Bone, a little lower and less than the other.

The lower Extremity of the Thigh Bone, which is articulated with the *Tibia* by *Ginglimus*, is divided in the middle by a *Sinus* into two Heads
or

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or Protuberances, the External and the Internal, which are received into the upper *Sinus's* of the *Tibia*; thorow the space which is between the hind Parts of these two Heads pass the great Vessels and Nerve which go to the Leg.

Patella.

In the Knee there is a little round Bone, about two Inches broad, pretty thick, a little convex on both sides, covered with a smooth Cartilage on its fore-side; it is soft in Children, but very hard in those of riper Years; it is called *Mola*, *Patella*, or Pan; over it pass the Tendons of the Muscles which extend the Leg, to which it serves as a Pulley for facilitating their Motion.

Tibia.

In the Leg there are two Bones, the inner and bigger is called *Tibia* or *Fossile majus*; 'tis hard and firm with a Cavity in its middle; 'tis almost triangular; its fore and sharp edge is called the Shin. In its upper Extremity it has two large *Sinus's* tipt with a soft and supple Cartilage called *Cartilago Lunata*, and divided from one another by a small Production. The *Sinus's* receive the two Protuberances of the Thigh Bone, and the Production is received in the *Sinus* which divides these two Protuberances. On the side of this upper end it has a small knob, which is received into a small

small *Sinus* of the *Fibula*; and on its fore part a little below the *Patella*, it has another into which the Tendons of the Extensors of the Leg are inserted. Its lower Extremity, which is much smaller than its upper, has a remarkable Process which forms the inner Ankle, and a pretty large *Sinus* divided in the middle by a small Protuberance; the *Sinus* receives the convex Head of the *Astragulus*, and the Protuberance is received into the *Sinus*, in the convex Head of the same Bone. It has another shallow *Sinus* in the side of its lower end, which receives the *Fibula*.

The outer and lesser Bone is called *Fibula*. *περόνη*, *Fibula* or *Focile Minus*; though it be much smaller than the *Tibia*, yet 'tis nothing shorter. It lies in the outside of the Leg, and its upper end which is not so high as the Knee, receives the lateral knob of the upper end of the *Tibia*, into a small *Sinus* which it has in its inner side. Its lower end is received into the small *Sinus* of the *Tibia*, and then it extends into a large Process, which forms the outer Ankle, embracing the External side of this *Astragulus*. The *Tibia* and *Fibula* touch not one another but at their ends; the space which they leave in their middle, is filled up by a strong mem-

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membranous Ligament, and some Muscles which extend the Feet and Toes.

In the Foot we distinguish three Parts, the *Tarsus*, *Metatarsus*, and Toes.

The Bones of the Tarsus are the Talus.

The *Tarsus* is the space between the Bones of the Leg and the *Metatarsus*; it is composed of seven Bones.

The first is called the *Astragulus* or *Talus*. In its upper Part it has a convex Head, which is articulated with the two Fociles of the Leg, by a *Ginglimus*, being it is divided by a little *Sinus*, which receives the small Protuberance in the middle of the *Sinus* of the *Tibia*. Its forepart which is also convex, is received into the *Sinus* of the *Os Naviculare*. Below, towards the hind part of its under side, it has a pretty large *Sinus* which receives the upper and hind part of the *Os Calcis*. But, towards the forepart of the same side, it has a Protuberance, which is received into the upper and forepart of the same Bone. Betwixt this *Sinus* and this Protuberance, there is a Cavity which answers to another in the *Os Calcis*, in which is contained an oily and mucous sort of Substance for moistening the Ligaments and facilitating the obscure Motion of these Bones when we go.

The

Of the Bones of the Thighs, &c. 237

The second Bone of the *Tarsus* is the *Calcaneus*. *Calcaneus*, *Os Calcis* or Heel Bone, it is the biggest of the Bones of the *Tarsus*. It lies under the *Astragulus*, to which it is articulated by *Ginglimus*, as we have now described. Behind, it has a large Protuberance which makes the Heel, and into which the *Tendo Achillis* is inserted. And before it has a Cavity which receives a part of the *Os Cubiforme*.

The third is the *Os Naviculare* or *Naviculare*. *Cymbiforme*; it lies between the *Astragulus* and the three *Ossa Cuneiformia*. Behind it has a large *Sinus*, which receives the fore convex Head of the first; and before, it is convex, distinguished into three Heads, which are received into the *Sinus*'s of the *Ossa Cuneiformia*.

The fourth, fifth, and sixth are called *Ossa Cuneiformia*, because they are *Ossa Cuneiformia*. large above, and narrow below; they lie all three at the side of one another; their upper side is convex and their under hollow, by which means the Muscles and Tendons in the Sole of the Foot are not hurt when we go. At one end they have each a *Sinus*, which receives the *Os Naviculare*, and at the other they are joined to the three inner Bones of the *Metatarsus*; the inmost of these Bones is the biggest,

biggest, and that in the middle the least.

The seventh Bone is called the *Ossa Cubiforme*, because of its Figure; it lies in the same rank with the *Ossa Cuneiformia*. Behind, it is joined to the *Ossa Calcis*, before, to the two outer Bones of the *Metatarsus*; and on its inside it is joined to the third *Ossa Cuneiforme*.

Metatarsus.

The Bones of the *Metatarsus* are five; That which sustains the great Toe is the thickest, and that which sustains the next Toe is the longest; the rest grow each shorter than another. They are longer than the Bones of the *Metatarsus*, in other things they are like them, and they are articulated to the Toes, as they are to the Fingers.

The Bones of the Toes.

The Bones of the Toes are fourteen. The great Toe hath two, and the rest have each three; they are like to the Bones of the Fingers, only they are shorter.

In the Toes there are ordinarily found twelve *Ossa Sesamoidea* as in the Fingers.

S E C T. XV.

Of the Nails and Number of the Bones.

THE Nails which are upon the Extremities of the Fingers and Toes, seem

seem to be of the same Nature as the Hoofs of other Animals. If you take the Hooff carefully off a Horse, Ox, or Hog, you shall see that it is nothing but a bundle of small Husks which answer to so many *Papilla* of the Skin. From whence we may conclude, that the Nails are nothing but the covers or sheaths of the *Papilla Pyramidales* of the Skin on the Extremities of Fingers and Toes, which dry, harden, and lie close upon one another; their use is to defend the ends of the Fingers when we handle any hard or rugged Body.

The Bones of a Skeleton, are

| | | | |
|-------------------------|---|--------------------------|----------|
| The <i>Os Frontis</i> | 1 | <i>Maxilla Inferior</i> | 1 |
| <i>Occipitis</i> | 1 | <i>Dentes Incisivi</i> | 8 |
| <i>Ossa Parietalia</i> | 2 | <i>Canini</i> | 4 |
| <i>Temporum</i> | 2 | <i>Molares</i> | 20 |
| <i>Ossicula Auditus</i> | 8 | <i>Os Hyoides</i> | 1 |
| <i>Os Ethmoides</i> | 1 | | <hr/> 61 |
| <i>Sphenoides</i> | 1 | <i>Vertebra Cervicis</i> | 7 |
| <i>Mali</i> | 2 | <i>Dorsi</i> | 12 |
| <i>Maxillare</i> | 2 | <i>Lumborum</i> | 5 |
| <i>Unguis</i> | 2 | <i>Ossis Sacri</i> | 6 |
| <i>Nasi</i> | 2 | <i>Os Coccygis</i> | 3 |
| <i>Palati</i> | 2 | <i>Scapulae</i> | 2 |
| <i>Vomer</i> | 1 | <i>Claviculae</i> | 2 |

Costae

The Bones of a Skeleton.

| | |
|--------------|----|
| <i>Costæ</i> | 24 |
|--------------|----|

| | |
|----------------|---|
| <i>Sternum</i> | 1 |
|----------------|---|

| | |
|------------------------|---|
| <i>Ossa Innominata</i> | 2 |
|------------------------|---|

| | |
|--|----------|
| | <hr/> 64 |
|--|----------|

| | |
|--------------------|---|
| <i>The Humerus</i> | 2 |
|--------------------|---|

| | |
|-------------|---|
| <i>Ulna</i> | 2 |
|-------------|---|

| | |
|---------------|---|
| <i>Radius</i> | 2 |
|---------------|---|

| | |
|-------------------|----|
| <i>Ossa Carpi</i> | 16 |
|-------------------|----|

| | |
|------------------|---|
| <i>Metacarpi</i> | 8 |
|------------------|---|

| | |
|------------------|----|
| <i>Digitorum</i> | 30 |
|------------------|----|

| | |
|--|----------|
| | <hr/> 60 |
|--|----------|

| | |
|-----------------------|---|
| <i>The Os Femoris</i> | 2 |
|-----------------------|---|

| | |
|---------------|---|
| <i>Rotule</i> | 2 |
|---------------|---|

| | |
|--------------|---|
| <i>Tibia</i> | 2 |
|--------------|---|

| | |
|---------------|---|
| <i>Fibula</i> | 2 |
|---------------|---|

| | |
|-------------------|----|
| <i>Ossa Tarsi</i> | 14 |
|-------------------|----|

| | |
|------------------|----|
| <i>Metatarsi</i> | 10 |
|------------------|----|

| | |
|------------------|----|
| <i>Digitorum</i> | 28 |
|------------------|----|

| | |
|--|----------|
| | <hr/> 60 |
|--|----------|

In all 245

Besides the *Ossa Sesamoidea*, which are sometimes found to the Number of 48.

C H A P. VI.

Of the Muscles which are not yet described.

S E C T. I.

Of the Muscles of the Face.

TH E Eye-brows have each a Muscle called *Corrugator*. It arises from the great Canthus of the Orbit, and terminates in the Skin about the middle of the Eye-brows. Some reckon this Pair only a Prolongation of the *Frontales*; their Name declares their Use.

The Nose has three Muscles. The first arises from the upper end of the two Bones of the Nose; and are inserted into the upper Part of the *Ala*. They pull the Nose upwards.

The second Pair arise from the *Os Maxillare*, and are inserted into the sides of the *Ala*. They dilate the Nostrils.

The third Pair arise from the same Bone, above the *Dentes Incisarii*, and are inserted into the Extremities of the *Ala*, which they pull downwards.

The Muscles of the Lips are four Proper Pair.

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The

Of the Muscles of the Face.

The *Incisivus*, or *Elevator Labii Superioris*; it arises from the upper Part of the fourth Bone of the upper Jaw, and descending obliquely is inserted into the upper Lip above the *Dentes Incisorii*.

Its Antagonist is the *Triangularis*, or *Depressor Labii Superioris*; it riseth from the lower edge of the lower Jaw, between the *Masseter* and the *Quadratus*, and ascendeth by the Angle of the Mouth to the upper Lip.

The *Caninus*, or *Elevator Labii Inferioris*; it riseth from the fourth Bone of the upper Jaw, below the *Incisivus*; it descends and passes under the Insertion of the *Zygomaticus*, and is inserted into the under Lip.

Its Antagonist is the *Quadratus*, or *Depressor Labii Inferioris*; this is somewhat thin, fleshy Fibres, which lie immediate under the Skin, upon the Chin; they arise from the edge of the fore-part of the under Jaw, and are inserted into the upper Lip.

There are three Muscles common to both the Lips.

The first and the second are *Zygomatici*, one on each side; they come from the *Os Zygoma*, and going obliquely they are inserted near the Angles of the Lips. When one of these Muscles acteth, it draws both Lips obliquely to sides.

Of the Muscles of the Face.

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side ; they receive often some Fibres from the *Caninus*.

The third is the *Orbicularis*, or *Sphincter Labiorum*, it surrounds the Lips with Orbicular Fibres ; when it acteth, it draws the Lips together.

There is one Muscle on each side common to the Lips and Cheeks, which is the *Buccinator*; it lies under the other Muscles ; it makes the inner Substance of the Cheeks ; its Fibres run from the *Processus Coronæ* of the lower Jaw, to the Angle of the Mouth : And they adhere to the upper part of the Gums of both Jaws. Thorow its middle pass the upper *Ductus Salivales*; by this Muscle we contract the Cavity of our Mouth, and thrust the Meat between our Teeth.

The Muscles of the lower Jaw, are twelve Pair, six on each side.

The first is the *Temporalis*, or *Crotaphites*; it arises by a Semicircular fleshy beginning from a Part of the *Os Frontis*, from the lower Part of the *Parietalis*, and upper Part of the *Temporalis*. From thence they go under the *Zygoma*, and gathering together as to their Centre, they are inserted by a short, but strong Tendon into the *Processus Coronæ* of the lower Jaw.

The second is the *Masseter*; it is a thick and short Muscle ; it arises from

the *Zygoma*, and from the first Bone of the upper Jaw, and is inserted into the lower edge of the lower Jaw, from its External Angle to its middle. Its Fibres run in three Directions; those which come from the *Zygoma* run obliquely to the middle of the Jaw; and those from the first Bone of the upper Jaw cross the former, and run to the Angle of the lower Jaw, and the Fibres which are in its middle run in a perpendicular from their Origin to their Insertion. These two Muscles pull the Jaw upwards.

The third is the *Pterigoidæus Internus*; it arises from the Internal Part of the *Processus Pterigoidæus*, and descends to be inserted into the Inferior Part of the Internal side of the lower Jaw, near its Angle. When this Muscle acteth, it draweth the Jaw to a side.

The fourth is the *Pterigoidæus Externus*; it riseth from the External Part of the same Process, and goes backwards, to be inserted between the *Processus Condiloides* and the *Corona* on the inside of the lower Jaw. This Muscle pulleth the lower Jaw forwards.

The fifth is the *Quadratus*; this is a broad, membranous Muscle, which lies immediately under the Skin; it riseth from the upper Part of the *Sternum* from

from the *Clavicula*, and from the *Acromium*; it covereth all the Neck, and adheres firmly to the lower edge of the lower Jaw; and being produced it covers also the lower Part of the Cheeks. When this Muscle acteth, it pulleth the Cheeks and Jaw downwards.

The sixth is the *Digastricus*; it ariseth fleshy from the upper Part of the *Processus Mastoideus*, and descending it contracts into a round Tendon, which passes thorow the *Stylohyoideus*; then it grows fleshy again, and ascends to the middle of the edge of the lower Jaw, where it is inserted. When this Muscle acteth, it pulleth the lower Jaw down.

S E C T. II.

Of the Muscles of the Head.

THE Head is lifted up, or pulled backwards by four pair of Muscles.

The first is the *Splenius*, which ariseth from the four upper Spines of the *Vertebrae* of the Back, and from the four lower of the Neck, and ascending obliquely, it adheres to the upper transverse Processes of the *Vertebrae* of the Neck, and is inserted into the upper Part of the *Occiput*.

The second is the *Complexus*; it ariseth from the transverse Processes of

the *Vertebra* of the Neck, and ascending obliquely, it adheres to the Spines of the same *Vertebra*, and is inserted into the *Occiput* : When one of these Muscles acteth, it moves the Head backwards to one side.

The third is the *Rectus Major*, it arises from the Spine of the second *Vertebra* of the Neck, and is inserted into the lower Part of the *Occiput*.

The fourth is the *Rectus Minor* ; it lies under the *Major* ; it cometh from the back Part of the first *Vertebra* of the Neck, and is inserted below the former. They nod the Head backwards.

The Semicircular motion of the Head is performed by

The *Obliquus Inferior*, which comes from the Spine of the second *Vertebra* of the Neck, and is inserted into the transverse Process of the first.

The *Obliquus Superior* comes from the transverse Process of the first *Vertebra* of the Neck, and is inserted into the Lateral and Inferior Part of the *Occiput*.

The *Mastoidæus* arises fleshy from the upper Part of the *Sternum*, and Extremity of the *Clavicula*, and ascending obliquely, 'tis inserted into the back part of the *Processus Mamillaris*. When either of these Muscles acteth,

eth, the Head turneth to the contrary side.

The Head is bended forwards by

The *Rectus Internus*, which arises from the forepart of the five Inferior transverse Processes of the *Vertebrae* of the Neck, and is inserted into the foremost *Appendix* of the Occipital Bone, near its great hole.

The *Rectus Internus minor*, observed and described by that accurate Anatomist Mr. Cooper, in his most exact Treatise of the Muscles; it lies on the forepart of the first *Vertebra*, like the *Rectus Minor* on the back part, and is inserted into the *Anterior Appendix* of the *Os Occipitis*, immediately under the former. These nod the Head forwards, being Antagonists to the last named Muscles.

Fallopins has described another Pair, which come from the transverse Processes of the first *Vertebra*, and is inserted near the *Processus Mammillaris*; these last help to move the Head a little to one side.

SECT. III.

Of the Muscles of the Neck.

THE Neck is bended and extended; it is bended by two Pair of Muscles.

Of the Muscles of the Scapula.

The first is the *Longus*, which is fastened to the Body of the five upper *Vertebra* of the Back, and to all those of the Neck; but because the last are more moveable than the first, therefore they are its Insertion, and those of the Back its Origination.

The *Scalemus* arises from the first and second Ribs and Part of the *Clavicula*; and ascending, it's inserted into all the transverse Processes of the Neck, except the first. This Muscle seems to be three; yet I will not encrease their number. It is perforated for the Passage of the Veins, Arteries, and Nerves. Because the neck is more easily moved than that Part of the Ribs to which they are fastened; therefore it's justly reckoned amongst the benders of the Neck.

The Neck is extended by the *Musculi Vertebrales*, of which afterwards.

S E C T. IV.

Of the Muscles of the Scapula.

THE *Scapula* is moved backwards and forwards, upwards and downwards by four Muscles.

The first is, the *Serratus Minor Anticus*; it riseth thin and fleshy, from the second, third, fourth, and fifth Superior Ribs, and ascending obliquely, it

Of the Muscles of the Scapula.

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it is inserted fleshy into the *Processus Coracoideus* of the *Scapula*, which it draws forwards; it helps also in Respiration.

The second is the *Trapezius*, or *Cucullaris*, because with its fellow it represents a Cowl; it arises from the *Occiput* above the *Splenius*, from the Spines of the *Vertebrae* of the Neck, and from the eighth Superior of the Back, and is inserted into the Spine of the *Scapula*, to the *Acromium*, and *Clavicle*. It moves the *Scapula* obliquely upwards, directly backwards, and obliquely downwards, according to the three Directions of its Fibres.

The third is the *Rhomboides*, so called from its Figure; it lies under the *Cucullaris*; it arises from the two Inferiour Spines of the Neck, and four Superior of the Back, and is inserted fleshy into the whole basis of the *Scapula*, which it draws backwards.

The fourth is the *Levator Scapulae*; it arises from the second, fourth, and fifth transverse Processes of the Neck, by so many distinct beginnings, which unite, and are inserted into the Superior Angle of the *Scapula*, which it draws upwards. It is also called *Musculus Patientiae*; because those who are any ways grieved use it.

These Muscles may move the Arm, as those of the Arm move it, because

250 *Of the Muscles of Respiration, &c.*
of the Connexion of the two Bones.
They help also in Respiration.

S E C T. V.

*Of the Muscles of Respiration, and of
the Benders and Extensors of the Ver-
tebræ.*

THE Cavity of the *Thorax* is dilated and contracted in Respiration by twenty nine Pairs of the Muscles: Fourteen Pair dilate it, and as many contract it: And one Pair, *viz.* the *Diaphragma*, helps both in the one and other; this last we have described already.

The Muscles which dilate the *Thorax* in Inspiration are

The *Intercostales Externi*; they are eleven on each side situated between the Ribs, they arise from the lower edges of each Superior Rib, and are inserted into the upper edges of each Inferior Rib; their Fibres descend obliquely from the back part forwards.

The *Subclavius* arises from the lower side of the half of the *Clavicula* that is nearest the *Acromium*, and descends obliquely to be inserted into the upper Part of the first Rib near the *Sternum*.

The *Serratus Anticus Major*; it comes from the whole basis of the *Scapula*,
and

and is inserted into the seven true Ribs, and first of the false Ribs by so many distinct Portions, which represent the teeth of a Saw. The *Obliquus Descendens* of the *Abdomen* lie between the spaces of its lower Indentations.

The *Serratus Posticus Superior*; it arises by a broad and thin Tendon from the two Inferior Spines of the *Vertebrae* of the Neck, and the three Superior of the Back, and growing fleshy, 'tis inserted into the second, third, and fourth Ribs by so many distinct Indentations.

When all these Muscles act, they draw the Ribs upwards, bringing the Ribs to right Angles with the *Vertebrae*; and consequently the Cavity of the *Thorax* must be wider and shorter: but because at the same time the *Diaphragma* contracts and becomes plain, therefore the Cavity is also longer.

The Muscles which contract the Cavity of the *Thorax*, are

The *Intercostales Interni*; they have the same Situation, Origination, and Insertion as the *Externi*, with this difference, that their Fibres run contrary to the Fibres of the *Externi*, viz. from the forepart backwards. It is more probable they also serve to dilate the *Thorax*; for when two Parts are equally drawn to one another, the more moveable, viz. the lower Ribs must approach

252 *Of the Muscles of Respiration, &c.*

approach the less moveable, viz. the upper Ribs, considering also that a greater strength is required to draw up the Ribs, than to pull them down, to their natural Position.

The *Triangularis* arises from the lower Part of the inside of the *Sternum*, and is inserted into the Cartilages where they join the Bones of the fourth, fifth, sixth, and sometimes seventh true Ribs.

The *Serratus Posticus Inferior* rises by a broad and thin Tendon from the three Inferior Spines of the *Vertebra* of the Back, and from the two Superior of the Loins, its Fibres ascending obliquely grow fleshy, and are inserted by four Indentations into the four last Ribs.

The *Sacrolumbus*; it arises fleshy from the Superior Part of the *Os Sacrum*, Posterior Part of the Spine of the *Ilium*, and from all the transverse Processes of the *Vertebra* of the Loins; It gives a small Tendon to the Posterior Part of each Rib near its root.

The Muscles which extend the *Vertebra* are the *Sacer*, the *Spinatus*, *Semi-spinatus* and *Transversalis Colli*, all which *M. Du Verney* reckons but one, which he calls *Vertebralis*, of which one Plan arises from the Spines of the *Os Sacrum* and of the *Vertebra* of the Loins, and is inserted into the Spines of the *Vertebra* of

of the Back; another arises from the Spines of the Back, and is inserted into those of the Neck: Under these there are others which go from the transverse Processes of the Inferiour *Vertebrae*, to the Spines of the Superior *Vertebrae*, and as many which go from the oblique Processes to the Superior Spines, of which ordinarily the Fibres of three oblique Processes make a Tendon to one Spine.

It seems to be as proper to make the Extensors of the *Vertebrae*, one compound Muscle as three; for in effect, they are almost as many really distinct Muscles, as there are oblique, transverse and acute Processes in the *Vertebrae*; but because this would multiply the number of the Muscles, and cause a great confusion if they were to have all distinct Names, therefore it is better to call them by the Name of *Musculi Vertebrales*.

The *Vertebrae* of the Neck are bended by two Pair of Muscles, which have been already described; the *Vertebrae* of the Back have no Benders, and those of the Loins are bended by the Muscles of the Lower Belly, and by one proper Pair which is called the *Psoas Parvus*; it arises fleshy from the sides of the upper *Vertebrae* of the Loins, and it has a thin and broad Tendon which embraces

254 *Of the Muscles of the Humerus, &c.*
embraces the *Psoas* of the Thigh, and which is inserted into the *Os Innominatum*, where the *Os Pubis* and *Ilium* join together.

S E C T. VI.

Of the Muscles of the Humerus, or Arm.

THE Arm moves five different ways, upwards, downwards, forwards, backwards, and round.

The Arm is lifted upwards by the *Deltoides*, *Supra spinatus*, and *Coracobrachialis*.

The *Deltoides* is of a triangular Figure, it comes from all the *Spina Scapula*, from the *Acromium*, from the External half of the *Clavicula*, from all these places its Fibres drawing together, pass above the Articulation of the *Humerus*, and are inserted by a short Tendon, four fingers below the Head of the same Bone, almost on its External side. *Steno* shews that this Muscle is composed of twelve simple Muscles: according to the direction of its Fibres, it pulls also the Arm a little forwards and backwards.

The *Supra spinatus* rises fleshy from all the basis of the *Scapula*, that is above the Spine. It fills all that space between the upper side of the *Scapula* and its Spine, to which two it is also attached;

Of the Muscles of the Humerus, &c. 255

attached; it passes above the *Acromium*, the Articulation of the *Humerus*, and is inserted into the Neck of the *Humerus*, which it embraces by its Tendon.

The *Coracobrachialis* rises from the *Processus Coracoides Scapulae*, by a tendinous beginning, and passing over the Articulation, it is inserted into the middle and Internal Part of the *Humerus*.

The *Teres Major* and the *Latissimus Dorsi* pull the Arm downwards.

The *Teres Major* rises from the lower Angle of the *Scapula*, and is inserted with the following a little below the Head of the *Humerus*.

The *Latissimus Dorsi* or *Aniscaptor*, with its fellow, covers almost all the Back. It hath a thin and large tendinous beginning, which comes from the Posterior Part of the Spine of the *Ilium*, from the Superior Spines of the *Ossae Sacrum*, from all the Spines of the *Vertebrae* of the Loins, and from the seven lower of the *Thorax*; it passes by the Inferior Angle of the *Scapula*, to which it is sometimes attached, and is inserted with the *Teres Major*, by a strong and broad Tendon.

The *Pectoralis* moves the Arm forwards; it arises by a fleshy and Semi-circular beginning, from the inner half of the *Clavicula*, from the Six Superior

256 *Of the Muscles of the Humerus, &c.*

rior Ribs; it covereth a great part of the Breast, and is inserted by a short, but strong and broad Tendon, into the upper and inner Part of the *Humerus*, between the *Biceps* and *Deltoides*. Its Fibres near their Insertion decussate each other. Those which come from the *Clavicle* and first Ribs, are on the lower side of the Tendon; and those from the inferior Ribs are on the upper side of the Tendon.

The Arm is drawn backwards by the *Infra spinatus*, the *Transversalis*, and the *Subscapularis*.

The *Infra spinatus* covers all the space that is between the Spine of the *Scapula*, and its Inferior side; and passing between the Spine and the *Teres Minor*; 'tis inserted into the Neck of the *Humerus*.

The *Transversalis*, or *Teres Minor*, comes from the Inferior edge of the *Scapula*, upon which it runs between the former and the *Teres Major*, and is inserted into the Neck of the *Humerus*.

The *Subscapularis* covers all the Internal side of the *Scapula*; it rises fleshy from its basis, from its upper and lower *Costa*, and is inserted into the Neck of the *Humerus*. It draweth the Arm close to the Ribs.

Thee

Of the Muscles of the Cubitus, &c. 257

The Tendons of these three last Muscles, surround the Articulation of the *Humerus*. When all these Muscles move successively, they move the Arm circularly.

S E C T. VII.

Of the Muscles of the Cubitus and Radius.

THE *Cubitus* is bended and extended by six Muscles; the *Biceps* and *Brachii Internus* bend it; the *Longus*, *Brevis*, *Brachii Externus*, and the *Anconeus* extend it.

The *Biceps* is so called, because it hath two Heads, of which one rises from the upper edge of the Cavity of the Head of the *Scapula*. This Head is round and tendinous, and is enclosed in the Channel in the Head of the *Humerus*. The other arises from the *Processus Coracoides*; it is broad and tendinous, and both together unite about the middle and forepart of the Arm, and make one Belly, which is inserted, by a strong and round Tendon, into the tubercle at the upper end of the *Radius*. Some of the Fibres of this Tendon form a large and thin *Aponeurosis* which covers all the Muscles of the *Radius* and Fingers externally. Care ought to be taken in Blood-letting, not to cut across, but

258 *Of the Muscles of the Cubitus, &c.*

but according to the length of the Fibres of this *Aponeurosis*.

The *Brachialis Internus*, lies partly under the *Biceps*; it arises by a fleshy beginning from the middle and Internal Part of the *Humerus*, and is inserted into the upper and forepart of the *Cubitus*, by a very short, but strong Tendon.

The *Longus* is the first of those which extend the *Cubitus*; it riseth from the Inferior *Costa* of the *Scapula*, nigh its Neck, and passeth between the two round Muscles; it descendeth upon the backside of the *Humerus*, where it joins with the two following.

The *Brevis* arises from the Superior and Posterior Part of the *Humerus*.

The *Brachialis Externus* arises about the middle and Posterior Part of the *Humerus*. These three join their fleshy Fibres together, and being externally tendinous, they cover all the Elbow, and are inserted into the *Olecranium*.

The *Anconeus* is a small Muscle which arises from the backpart of the Extremity of the *Humerus*, passes over the Elbow, and is inserted into the Lateral and Internal Part of the *Ulna*, about three or four fingers breadth below the *Olecranium*.

The *Radius* hath four Muscles, two *Pronatores*, which turn the Palm of the Hand

Of the Muscles of the Cubitus, &c. 259

Hand downwards, they are the *Rotundus* and the *Quadratus*, and two *Supinadores*, which turn the Palm upwards, they are called *Longus* and *Brevis*.

The *Rotundus* arises fleshy from the Internal Extuberance of the *Humerus*, and goes obliquely to be inserted into the middle and External Part of the *Radius*.

The *Quadratus* arises by a broad and fleshy beginning from the lower and Internal Part of the *Ulna*; it passes over the Ligament that joins the *Radius* to the *Ulna*, and is inserted as broad as its beginning into the External and lower Part of the *Radius*.

The first of the *Supinadores* is the *Longus*; it ariseth by a fleshy beginning, three or four fingers breadth, above the External Extuberance of the *Humerus*. It lies all along the *Radius*, to whose Inferior and External Part it is inserted by a pretty broad Tendon.

The second is the *Brevis*; it cometh from the External and upper Part of the *Ulna*, and passing round the *Radius*, 'tis inserted into its upper and forepart, below the Tendon of the *Biceps*.

S E C T. VIII.

*Of the Muscles of the Palm of the Hand
and of the Wrist.*

THE Muscles of the Palm of the Hand are two.

The first is that which is commonly known by the Name of *Palmaris*; it ariseth from the Internal Extuberance of the *Humerus*, and by a long and slender Tendon it passes above the *Ligamentum Annulare* to the Palm of the Hand, where it expands it self into a large *Aponeurosis*, which cleaves close to the Skin above, and to the sides of the Bones of the *Metacarpe* below, and to the first *Phalanx* of the Fingers, by which means it makes four Cases for the Tendons of the benders of the Fingers to pass thorow. This Muscle is sometimes wanting, but the *Aponeurosis* is always there.

The second may be called *Palmaris Brevis*; it lies under the *Aponeurosis* of the first; it arises from the Bone of the *Metacarpus* that sustains the little Finger, and from that Bone of the *Carpus* that lies above the rest. It goes transversely, & is inserted into the eighth Bone of the *Carpus*. The first assists the Hand to grasp any thing closely, and the second makes the Palm of the Hand Concave.

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The Muscles of the Wrist are four, two Internal for bending of it, and two External for extending it.

The first is the *Cubitæus Internus*; it arises from the Internal Extubérance of the *Humerus* and upper Part of the *Ulna*, upon which it runs all along, till it pass under the *Ligamentum Annulare*, and is inserted by a strong and short Tendon into the fourth of the first Order of the *Carpus*.

The second is the *Radiæus Internus*, which comes from the same Part with the former, and lying along the *Radius*, it is inserted into the first Bone of the *Metacarpus* that sustains the forefinger. These two Muscles bend the Wrist.

The third, which is the first of the Extensors, is the *Cubitæus Externus*; it cometh from the External Extubérance of the *Humerus*, and passing its Tendon under the *Ligamentum Annulare*, tis inserted into the fourth Bone of the *Metacarpus* that sustains the little Finger.

The fourth is the *Radiæus Externus* or *Bicornis*, which is two distinct Muscles; the first arises from above the External Protuberance of the *Humerus*, and the second from the lowermost Part of the External Protuberance. They both lie along the External

262 *Of the Muscles of the Fingers.*

nal Part of the *Radius* ; they pass under the annular Ligament, and the one is inserted into the Bone of the *Metacarpus* that sustains the Fore-finger, the other to that which sustains the Middle-finger ; these two extend the Wrist.

S E C T. IX.

Of the Muscles of the Fingers.

THE Fingers are bended and extended, they are drawn to, and from the Thumb, by several Muscles. The Muscles which bend them are the *Sublimis* and the *Profundus*.

The *Sublimis*, otherwise called *Perforatus*, arises from the Internal Protuberance of the *Humerus*, and from the upper and forepart of the *Radius* : It divides into four Parts which send four Tendons, which pass under the annular Ligament to be inserted into the upper Part of the second *Phalanx* of each of the four Fingers. Each of these Tendons as they pass the first internode of the Fingers, have a slit in their middle for the passage of the Tendons.

The *Profundus* which lies under the *Sublimis*; it ariseth fleshy from the upper Part of the *Ulna*, and from the Ligament that joins this Bone to the *Radius* ; the lower Part of its Body is outwardly tendinous ; it divides into four

Of the Muscles of the Fingers. 263

four round Tendons, which pass under the annular Ligament, and throw the flits of the former Tendons, to be inserted into the third Bone of the Fingers.

These Muscles have this in particular, that the Tendons of the uppermost give passage to the Tendons of the lower. And their Tendons upon the Palm of the Hand are enclosed in cases from the *Aponeurosis Palmaris*, and upon the Fingers in strong membranous cases which are fixt to the sides of each Finger.

The *Extensor Digitorum Communis*, arises from the External Protuberance of the *Humerus*, and at the Wrist it divides into three flat Tendons, which pass under the annular Ligament, to be inserted into all the Bones of the fore, middle, and ring Finger. These Tendons near the first internodes of the Fingers give some tendinous Fibres to each other, and some also to the *Interossei*.

The *Lumbricales*, or *Vermiculares* are small Muscles which rise from the Tendons of the *Profundus*, and are inserted into the first internodes of each Finger. On their Internal sides next the Thumb, they assist in bending the first Joint of the Fingers.

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The *Interossei*, some reckon six, and others, more justly, eight; they are contained betwixt the spaces of the Bones of the *Metacarpus*; the one half of them lies betwixt the spaces that these Bones leave towards the Palm off the Hand; they are the Internal *Interossei*; they arise from the upper Part of the Bones of the *Metacarpus* next the *Carpus*, and they are inserted on the Internal sides of the first Bones off the Fingers, with the *Lumbricales*; they are the *Adductores Digitorum*, for they bring the Fingers to the Thumb. The other half are contained in the spaces that the Bones of the *Metacarpus* leave on the Back of the Hand, they rise from the upper Part of the Bones of the *Metacarpus* next the *Carpus*, and they are inserted on the External sides of the first Bones of the Fingers, and not on the same side with the former, as Mr. Cooper alledges; and these are the *Abductores Digitorum*, for they draw the Fingers from the Thumb.

The Thumb is bended by two Muscles. The first arises from the Internal Extubérance of the *Humerus*, from the middle and inner Part of the *Radius*, by two different Orders of fleshy Fibres: and passing under the *Ligamentum Annulare*, its Tendon is inserted into the

Of the Muscles of the Fingers. 265

the third Bone of the Thumb. The second arises from the Bones of the *Carpus*, from the annular Ligament, and is inserted into the second internode of the Thumb. These two Muscles are called *Flexores Pollicis*.

It is extended by two Muscles, which are the *Longus* and *Brevis*.

The *Longus* arises from the upper, and External Part of the *Ulna*; it passes obliquely over the Tendon of the *Radialis Externus*, and is inserted near the second joint of the Thumb. This may be separated into two distinct Muscles, and some reckon it so, for its Tendon is also double.

The *Brevis* arises a little lower than the former from the *Ulna*, and is inserted into the third Bone of the Thumb.

The *Tenar* draws the Thumb from the Fingers; it makes that Part which is called *Mons Veneris*; it ariseth from the *Ligamentum Annulare*, and first Bone of the *Carpus*, and is inserted into the External side of the Thumb.

The *Antitenar* draws the Thumb to the Fingers; it ariseth from the Bone of the *Metacarpus* that sustains the fore-finger, and is inserted into the first Bone of the Thumb.

The *Abductor Indicis* arises from the repart of the first Bone of the Thumb,
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and is inserted into the Bones of the Fore-finger; it draws this Finger to the Thumb.

The *Index* hath a particular *Extensor*, which comes from the middle and external Part of the *Ulna*; it passeth under the annular Ligament, and is inserted into the third Bone of the Fore-finger, where it joins the *Extensor Communis*.

The little Finger hath two proper Muscles, the one draws it from the other Fingers, the other extends it. The first is called *Hypotenar*; it ariseth from the fourth Bone of the second rank of the Bones of the *Carpus*, and from the *Ligamentum Annulare*, and is inserted externally into the first Bone of the little Finger; this draws it from the other Fingers.

The *Extensor* of the little Finger arises from the External Protuberance of the *Humerus*, and from the upper Part of the *Ulna*; it passeth under the annular Ligament, and is inserted into the third Bone of the little Finger.

S E C T. X.

Of the Muscles of the Thigh.

THE Thigh is bended and extended, moved outwards and inwards obliquely and circularly by thirteen Muscles.

Of the Muscles of the Thigh. 267

It is bended by the *Psoas*, *Iliacus*, and *Pectineus*.

The *Psoas* arises from the Internal side of the transverse Processes of the *Vertebrae* of the Loins, within the *Abdomen*, and descending upon Part of the Internal side of the *Ilium*; it is inserted into the lower Part of the little *Trochanter*.

The *Iliacus* arises from the Internal Cavity of the *Os Ilium*, and descending it joins with the former, with which it is also inserted.

The *Pectineus* arises from the External Part of the *Os Pubis*, and is inserted a little below the lesser *Trochanter*.

The Thigh is extended by the *Gluteus Major*, *Medius* and *Minor*.

The *Gluteus Major* arises Semicircularly from the *Os Coccygis*, the Spines of the *Sacrum*, and from the Spine of the *Ilium*, and descending 'tis inserted into the *Linea Aspera*, four fingers breadth below the great *Trochanter*.

The *Gluteus Medius* arises from all the Spine of the *Ilium* under the former, and is inserted into the Superior and External Part of the great *Trochanter*.

The *Gluteus Minor* arises from the lower Part of the External side of the *Ilium*, under the former, and is inserted at the Superior Part of the great *Trochanter*.

The Thigh is moved inwards, or they are both brought together by the *Triiceps* which hath three Originations and three Insertions, and may be divided into three Muscles.

The first arises from the *Os Pubis*, and is inserted above the second into the *Linea Aspera* of the Thigh Bone.

The second arises from the lower Part of the *Os Pubis*, and is inserted about the middle of the *Linea Aspera*.

The third arises from the *Os Pubis*, where it joins the *Os Ischium*, and is inserted from a little below the second to the Internal and lower *Apophisis* of the Thigh Bone: When they act, they pull the Thigh Bone inwards, and turn it a little outwards.

The Thigh is turned outwards by the *Quadrigemini*.

The first is, the *Pyriformis*, or *Iliacus Externus*; it arises round and fleshy from the Inferior and Lateral Part of the *Os Sacrum*, and is inserted with

The second and third called *Gemini*, which arise from the Protuberance of the *Ischium*, and are inserted with the first in the dent at the root of the great *Trochanter*.

The fourth is the *Quadratus*, it comes from the Protuberance of the *Ischium*, and is inserted into the outside of the great *Trochanter*.

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The Thigh is moved circularly and obliquely when these Muscles act successively, but particularly by the two *Obturatores*.

The *Obturator Internus* comes from the Internal Circumference of the hole that is between the *Ischium* and *Pubis*, and passing thorow the Sinuosity of the *Ischium*, it is inserted into the dent of the great *Trochanter*. Its Tendon lies between the *Gemini*; it turns the Thigh to the outside.

The *Obturator Externus* comes from the External Circumference of the same hole as the former; it embraces the Neck of the Thigh Bone, and passes under the *Quadratus* to the small Cavity of the great *Trochanter*.

S E C T. XI.

Of the Muscles of the Leg.

THE Leg is bended by four Muscles, and extended by four others. The Muscles which bend it are,

The *Seminervosus*, which arises from the Protuberance of the *Ischium*, and is inserted by a round Tendon into the Internal Part of the *Epiphisis* of the *Tibia*.

The *Semimembranosus* arises tendinous from the Protuberance of the *Ischium*, immediately below the former,

and is inserted by a large Tendon into the upper and back Part of the *Tibia*.

The *Biceps*, so called, because it has two Heads, of which one comes from the tuberosity of the *Ischium*, the other from the middle of the *Linea Aspera*, both which join together, and are inserted by one Tendon, into the Superior and External Part of the *Perone*.

The *Gracilis* arises from the union of the *Os Pubis* and *Ischium*, and descending by the inside of the Thigh, it grows tendinous, and is inserted into the Superior and Internal side of the *Tibia*.

The Leg is extended by four Muscles, which are

The *Rectus*; it arises from the lower Part of the Spine of the *Ilium*, and descending between the two following, it's inserted with them.

The *Vastus Externus*, which comes from the root of the great *Trochanter* and Part of the *Linea Aspera*.

The *Vastus Internus*, which arises from the root of the lesser *Trochanter*.

The *Crureus*, which comes from the forepart of the Thigh Bone, between the great and lesser *Trochanter*, and lying close upon the Bone, it joins its Tendon with the three former, which all together make one broad Tendon which passes over the *Patella*, and is inserted

Of the Muscles of the Foot.

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inserted into the little tuberosity on the upper and forepart of the *Tibia*.

The Leg is moved obliquely by three Muscles.

The *Longus* or *Sartorius*; it arises from the Inferior Part of the Spine of the *Ilium*, and running obliquely by the inside of the Thigh, is inserted into the Internal side of the *Tibia*, three or four fingers breadth below its upper Extremity. By this Muscle we throw one Leg and Thigh across another.

The *Popliteus*; it arises from the External and Inferior Protuberance of the Thigh Bone, and passing over the Joint obliquely is inserted into the Superior and Internal Part of the *Tibia*. This assists in bending of the Leg, and turns it a little inwards.

The *Membranosus*, or *Fascia Lata*, which arises fleshy from the forepart of the Spine of the *Ilium*, and a little below it becomes membranous or tendinous, and covers almost all the Muscles of the Thigh and Leg down to the Foot. This Muscle helps in extending of the Leg, and turns the Leg a little outwards.

S E C T. XII.

Of the Muscles of the Foot.

THE Foot is bended by the *Tibialis* and *Peroneus Anticus*.

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The *Tibialis Anticus* arises fleshy from the upper and forepart of the *Tibia*, and adhering to the External side of the *Tibia*, as it descends it passes under the *Ligamentum Annulare*, and is inserted by two Tendons into the first *Os Cuneiforme*, and into the *Os Metatarsi* that sustains the little Toe.

The *Peroneus Anticus* is joined to the *Posticus*, at its Origination, which is from the upper and External half of the *Perone*, and running thorow the Channel, which is in the External Ankle, 'tis inserted into the *Os Metatarsi* that sustains the great Toe.

The Foot is extended by four Muscles.

The first and second are the *Gasteronemius* or *Gemellus*, which with the *Soleus*, make the Calf of the Leg, the one arises from the back Part of the Internal Protuberance of the Thigh Bone, the other from the same Part of the External Protuberance of the same Bone; they have two large fleshy Bellies, which join and make one Tendon with the following, which is inserted into the *Os Calcis*.

The third is the *Soleus*, which lies under the former; it arises from the upper and back Part of the *Tibia* and *Perone*, and descending it joins its Tendon with the former. The Tendon of these three Muscles is big, and strong, called *Tendo Achillis*. The

The fourth is the *Plantaris* ; it has a fleshy Origination from the back Part of the External Protuberance of the Thigh Bone, and descending a little way between the *Gemellus* and *Soleus*, it becomes a long and slender Tendon, which marches by the inside of the great Tendon, and at the Sole of the Foot it is expanded into a large *Aponeurosis*, which has the same use, situation, and connexion, as that of the Palm of the Hand.

The Foot is moved side-ways by two Muscles.

The *Tibialis Posticus*, which arises from the Superior and back Part of the *Tibia* and *Fibula*, and Membrane that ties them together, and descending by the hind Part of the *Tibia*, it passes thorow the Fissure of the inner Ankle, and is inserted into the under side of the *Os Naviculare* ; it moveth the Foot inwards.

The *Peroneus Posticus* arises from the Superior and External Part of the *Perone*, and descending it passes thorow the Fissure of the External Ankle under the Sole of the Foot, to be inserted into the *Os Metatarsi*, that sustains the great Toe. When this Muscle acteth, it pulleth the Foot outwards.

S E C T. XIII.

Of the Muscles of the Toes.

THE four lesser Toes are bended, and extended, and moved side-ways.

They are bended by the *Profundus* and *Sublimis*.

The *Profundus* arises from the upper and back Part of the *Tibia*, and passing under the inner Ankle, and Ligament that ties the *Tibia* and *Os Calcis* together, it divides into four Tendons, which pass thorow the holes of the *Sublimis*, are inserted into the third Bones of each lesser Toe. There is a *Massa Carneæ* that arises from the *Os Calcis*, and which joins the Tendons of this Muscle where the *Lumbricales* begin.

The *Sublimis* or *Flexor Brevis* arises from the inner and lower Part of the *Os Calcis*, and is inserted by four Tendons into the second *Phalanx* of each Toe. These Tendons are perforated to give way to the Tendons of the *Profundus*.

The Toes are extended by the *Longus* and *Brevis*.

The *Longus* comes from the Superior and External Part of the *Tibia*, and from the upper Part of the *Fibula*, and being divided into four Tendons, it passes under the *Ligamentum Annulare*, and is inserted into the third Bones of the lesser Toes.

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Of the Muscles of the Toes.

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The *Brevis* lies under the Tendons of the former, and arises from the External and forepart of the *Os Calcis*, and is inserted by four Tendons into the second *Phalanx* of the Toes. These Tendons cut the Tendons of the former at acute Angles.

The four *Lumbricales* arise from the Tendons of the *Profundus*, and are inserted into the inside of the lesser Toes.

The eight *Interossei*, which lie betwixt the Bones of the *Metatarsus*, have the same situation, use, origination, and insertion, as those of the Hand.

The *Abductor Minimi Digiti* arises from the External Part of the *Os Calcis*, and lying upon the outside of the *Os Metatarsi*, that sustains the little Toe, 'tis inserted into the upper Part of the first Bone of the same Toe Externally.

The great Toe is bended, extended, and moved side-ways by several Muscles.

The *Flexor Pollicis* arises from the upper and back Part of the *Fibula*, and passing by the inner Ankle, it's inserted into the last Bone of the great Toe.

The *Extensor Pollicis* arises from near the upper half of the *Perone* forwardly, and passing under the *Ligamentum Annulare*, is inserted into the last Bone of the great Toe.

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The *Tenar* or *Abducens Pollicis* arises from the *Os Calcis*, and from the *Os Metatarsi*, that sustains the great Toe, and is inserted into the External side of the first Bone of the great Toe.

The *Antitenar* or *Adductor Pollicis* arises from the Inferior Part of the third *Os Cuneiforme*, and passing obliquely is inserted into the inside of the first Joint of the great Toe.

The *Adductor Indicis* arises from the first Bone of the great Toe, and is inserted into the sides of the Bones of that Toe next the great Toe.

The *Transversalis* comes from the Bone of the *Metatarsus* that sustains the little Toe, and passing across the other Bones, 'tis inserted into the inside of the first Bone of the great Toe. Its use is, to bring all the Toes close to one another.

A TABLE

A TABLE

OF THE

MUSCLES.

FRontales,

They pull the Skin of the Forehead upwards. The Muscles of the Forehead are one Pair.

Occipitales,

They pull the Skin of the hind Head upwards. of the Hind-Head one Pair.

Attollens,

Auri-
cula-
rum.

Of the Ears
five Pair.

Deprimens,**I**nternus Malleoli,

It distends the Tympanum.

Externus Malleoli,

It relaxes the Tympanum.

Musculus Stapedis,

It moves the Stirrup.

Corrugator Super-
cilii,

Of the Eye-
brows one
Pair.

Rectus Palpebræ
Superioris,

It lifts up the upper Eye-lid. Eye-lids two
Pair.

Orbicularis Palpe-
brarum,

It shuts both Eye-lids.

Attollens**D**eprimens**A**bductor**A**dductor

Ocu-
lorū.

Eyes six Pair.

Obliquus,

Obliquus Major, *It pulls the Eye forwards and obliquely downwards.*

Obliquus Minor, *It pulls the Eye forwards and obliquely upwards.*

*Of the Nose
three Pair.*

Attollens }
Dilatens } Nares,
Deprimens }

*Of the Lips
five Pair and
one single one.*

Incisivus, *It pulleth the upper Lip upwards.*

Triangularis, *It pulleth it downwards.*

Caninus, *It pulleth the lower Lip upwards.*

Quadratus, *It pulleth it downwards.*

Zygomaticus, *It draws both Lips obliquely to either side.*

Orbicularis, *It draws both Lips together.*

*Of the Cheeks
one Pair.*

Buccinator, *It thrusts the Meat between our Teeth.*

*Of the Lower
Jaw six Pair.*

Temporalis, }
Masseter, } *They pull the Jaw upwards.*

Pterigoidæus internus, *It draws the Jaw to either side.*

Pterigoidæus externus, *It draws the Jaw forwards.*

Quadratus, *It pulleth the Jaw and the Cheeks downwards.*

Digastricus,

A Table of the Muscles.

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|---------------------------|--|------------------------------|
| Digastricus, | It pulleth the Jaw downwards. | |
| Peristaphilinus internus. | It pulleth the Uvula forwards. | Of the Uvula two Pair. |
| Peristaphilinus externus, | It pulleth the Uvula backwards. | |
| Styloglossus, | It draws the Tongue upwards. | Of the Tongue three Pair. |
| Genioglossus, | It pulls it out of the Mouth. | |
| Ceratoglossus, | It pulls it into the Mouth. | |
| Geniohyoidæus, | It pulls the Os Hyoides and the Tongue upwards and forwards. | Of the Os Hyoides five Pair. |
| Sternohyoidæus, | It pulls the Os Hyoides downwards. | |
| Mylohyoidæus, | It pulls it obliquely upwards. | |
| Coracohyoidæus, | It pulls it obliquely downwards. | |
| Stylohyoidæus, | It pulls it to either side and somewhat upwards. | |
| Stylo-Pharyngæus, | It pulleth up and dilateth the Pharynx. | Of the Pharynx two Pair. |
| Oesophagæus, | It straitens the Pharynx. | |
| Sternothyroidæus, | It pulls the Thyroides downwards. | Of the Larynx six Pair. |

Hyothy-

| | | |
|-----------------------------------|---------------------------------|--|
| | Hyothyroidæus, | <i>It pulls the Thyroides upwards.</i> |
| | Cricothyroidæus, | |
| | Cricoarytenoidæus, | |
| | Thyroarytenoidæus, | <i>It dilates the Glottis.</i> |
| | Arytænoidæus, | <i>It contracts the Glottis.</i> |
| <i>Of the Head nine Pair.</i> | Splenius, | <i>They move the Head backwards.</i> |
| | Complexus, | |
| | Rectus major | <i>They nod the Head backwards.</i> |
| | Rectus minor | |
| | Obliquus inferior | <i>They perform the Semicircular motion of the Head.</i> |
| | Obliquus superior | |
| | Mastoidæus, | |
| <i>Of the Thorax 29 Pair.</i> | Rectus internus major, | <i>They nod the Head forwards.</i> |
| | Rectus internus minor, | |
| | Intercostales interni & externi | |
| | Subclavius, | <i>They pull the Ribs upwards in Inspiration.</i> |
| | Serratus anticus major, | |
| | Serratus posticus superior, | |
| | Triangularis, | <i>They make the motion of the Ribs downwards in Expiration the swifter.</i> |
| | Serratus posticus inferior, | |
| | Sacrolumbaris, | |
| | | |

A Table of the Muscles.

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Diaphragma,

*Its use is both in In-
spiration and Ex-
piration.*

Obliquus exter-
nus,

Obliquus inter-
nus,

Transversalis,

Rectus,

Pyramidalis,

*They compress all the Parts contained in the Lower Belly: they assist the motion of the Ribs downwards in Ex-
piration, and they help to bend the Vertebrae of the Loins forwards.*

Vertebralis,

Longus, }
Scalenus, }

Psoas Parvus,

It extends all the Vertebrae of the Body.

*They bend the Ver-
tebrae of the Neck.
It helps to bend the
Vertebrae of the
Loins.*

Cremaster,

*It draws up the Te-
sticles in the act of
Generation.*

Erectores Penis,

Acceleratores Uri-
nae,

Erectores Clitori-
dis,

*Of the Clito-
ris one Pair.*

Sphincter,

*One single
Muscle of the
Bladder.*

Sphincter Vesicæ,

*It contracts the Neck
of the Bladder that
the Urine may not
run continually.*

*Of the Anus
three single
Muscles.*

Levatores ani,

*They draw up the
Anus.*

Sphincter ani,

It shuts the Anus.

*Of the Shoul-
der Blades
four Pair.*

Serratus anticus

*It draws the Shoul-
der blade forwards..*

minor,

Trapezius,

*It moves it upwards,
backwards, and
downwards.*

Romboides,

It pulls it backwards..

Levator Scapulæ,

*It pulls the Shoulder
Blade upwards.*

*Of the Shoul-
der Bones
nine Pair.*

Deltoides,

*They lift the Arm
upwards.*

Supra Spinatus,

Coracobrachialis,

Teres major,

*They pull the Arm
downwards.*

Latissimus dorsi,

Pectoralis,

*It moves the Arm
forwards.*

Infra Spinatus,

Transversalis,

Subscapularis,

*They draw the Arm
backwards.*

*Of the Cubiti
six Pair.*

Biceps,

Brachiaëus inter-
nus,

*They bend the fore-
Arm.*

Longus,

Brevis,

Brachiaëus exter-
nus,

*They extend the fore-
Arm.*

Anconæus,

Rotundus

A Table of the Muscles.

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Rotundus, }
Quadratus, }

They perform the motion of Pronation, or they turn the Palm of the Hand downwards.

*of the Radii
four Pair.*

Longus, }
Brevis, }

They perform the motion of Supination, or they turn the Palm of the Hand upwards.

Cubitaëus inter-
nus, }

Radiaëus inter-
nus, }

Cubitaëus exter-
nus, }

Radiaëus exter-
nus, }

Palmaris,

They bend the Wrist.

*Of the Wrists
four Pair.*

They extend the Wrist.

It helps the hand to grasp any thing closely.

*Of the Palms
of the Hands
two Pair.*

Palmaris brevis,

It makes the Palm of the Hand concave.

Sublimis, }
Profundus, }

Extensor Digi-
torum communis,

Lumbricales,

They bend the Fingers.

*Of the Fin-
gers fifteen
Pair.*

They assist in bending the first Joint of the Fingers.

Interossei interni,

They draw the Fingers to the Thumb.

Interossei,

Interossei externi, *They draw the Fingers from the Thumb.*

The particular Muscles of the Thumbs are six Pair.

Flexor pollicis longus,

Flexor pollicis brevis,

Extensor pollicis longus,

Extensor pollicis brevis,

Tenar,

It draws the Thumb from the Fingers.

Antitenar,

It draws the Thumb to the Fingers.

Of the Fore Fingers two Pair.

Abductor Indicis, Extensor Indicis,

Of the little Fingers two Pair.

Hypotenar,

It draws the little Finger from the rest.

Extensor auricularis,

The Muscles of the Thighs are thirteen Pair.

Psoas,

Iliacus,

Pectinæus,

Glutæus major,

Glutæus medius,

Glutæus minor,

Triceps,

They bend the Thigh.

They extend the Thigh.

It pulls the Thigh inwards.

Pyriformis,

Gemini,

Quadratus,

They move the Thigh outwards.

Obtura-

A Table of the Muscles.

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Obturator inter-
nus, } *They help to move the*
Obturator exter- } *Thigh obliquely &*
nus. } *circularly.*

Seminervosus, } *Of the Legs*
Semimembrano- } *eleven Pair.*
sus, } *They bend the Leg.*

Biceps, }
Gracilis, }
Rectus, }
Vastus externus, } *They extend the Leg.*
Vastus internus, }
Crureus, }
Sartorius, }

It makes the Legs
cross one another.

Poplitæus, *It turns the Leg*
somewhat inwards.

Membranosus, *It turns it a little*
outwards.

Tibialis anticus, } *Of the Feet*
Peronæus anti- } *eight Pair.*
cus, } *They bend the Foot.*

Gasterocnemii, } *They extend the Foot.*
Solæus, }
Plantaris, }

Tibialis posticus, *It moveth the Foot*
inwards.

Peronæus posticus, *It moveth the Foot*
outwards.

Profundus, } *Of the Toes*
Sublimis, } *twenty three*
Lumbricales, } *Pair.*
They bend the four
lesser Toes.

Longus,

| | | |
|----------------------------|---|---|
| Longus, | } | <i>They extend the four lesser Toes:</i> |
| Brevis, | | |
| Flexor Pollicis, | | |
| Extensor Pollicis, | | |
| Tenar, | | <i>It draws the great Toe from the rest.</i> |
| Antitenar, | | <i>It draws it to the rest.</i> |
| Adductor Indicis, | | |
| Abductor minimi digiti, | | |
| Interossei interni, | | <i>They draw the Toes to the great Toe.</i> |
| Interossei externi, | | <i>They draw them from the great Toe.</i> |
| Transversalis, | | <i>It brings all the Toes close to one ano- ther.</i> |

In all 426 Single Muscles in the Body.

C H A P. VII.

Of the Nerves, Veins, and Arteries.

S E C T. I.

Of the Nerves in General.

A Nerve is a long and small bundle of very fine Pipes, or hollow Fibres, wrapt up in the *Dura* and *Pia Mater*; which last not only covers them all in common, but it also encloses every Fibre in particular.

The Medullary Substance of the Brains, is the beginning of all the Nerves; and 'tis probable that each Fibre of the Nerves answers to a particular Part of the Brain at one end, and to a particular Part of the Body at its other end, that whenever an Impression is made upon such a Part of the Brain, the Soul may know that such a Part of the Body is affected.

The Nerves do ordinarily accompany the Arteries thorow all the Body, that the Animal Spirits may be kept warm and moving by the continual heat and pulse of the Arteries. They have

have also Blood-Vessels as the other Parts of the Body ; these Vessels are not only spread upon their Coats, but they run also amongst their Medullary Fibres, as may be seen amongst the Fibres of the *Retina*. Where-ever any Nerve sends out a branch, or receives one from another, or where two Nerves join together, there is generally a *Ganglio* or *Plexus* either less or more, as may be seen at the beginning of all the Nerves or the *Medulla Spinalis*, and in many other places of the Body.

SECT. II.

Of the Nerves which come immediately out of the Skull.

THE Nerves are divided into those which come immediately out of the Skull, and those which come out between the *Vertebrae*. The first sort come from the *Medulla Oblongata*, which has been already described, and they are ten Pair.

Nervi Ol-
factorii.

The first Pair are called *Nervi Olfactorii*; they rise from the basis of the *Corpora Striata*, and passing thorow the little holes of the *Os Cribriforme*, they are spread upon the Membrane which covers the *Os Spongiosum*.

Optici.

The second are called *Optici*, they rise partly from the Extremities of the

the *Corpora Striata*, and partly from the *Thalami Nervorum Opticorum*, which last they almost embrace; from thence approaching one another, they unite above the *Cella Turcica*, and immediately dividing again, they pass thorow the foremost holes of the *Os Sphenoides* into the Orbit, where piercing the Globe of the Eye, their Medullary Fibres are spread upon the glassy Humour.

The third are called *Oculorum Motores*, Oculorum Motores. they arise from the *Medulla Oblongata* on each side of the *Infundibulum*, and the Carotidal Arteries lie between them; from thence passing thorow the *Foramina Lacera* of the *Os Sphenoides*, they give a branch, which, with a branch of the fifth Pair, forms a considerable *Plexus*, which sends out several twigs which embrace the Optick Nerve, and are spent on the Tunicks of the Eye; they give a branch to the Muscles called *Attollens*, *Deprimens*, and *Obliquus Minor* of the Globe.

The Fourth Pair are called *Pathetici*, Pathetici. that rise from a small Medullary Cord that is behind the *Testes*; they go down upon the sides of the *Medulla Oblongata*, and passing under the *Dura Mater* by the sides of the *Cella Turcica*, they go thorow the *Foramina Lacera*,
O cera,

cera, and are wholly spent on the *Obliquus Major*.

The fifth Pair. The fifth Pair rise from the forepart of the *Processus Annularis*; they are the biggest Pair of the Brain; they give Nerves to the *Dura Mater*; each of them divides into three branches, of which the foremost is called *Ramus Ophthalmicus*, because it passes thorow the *Foramen Lacerum* into the Orbit, where it divides into two branchess. The first sends out a branch which joins a branch of the *Motores*, and forms the *Plexus Ophthalmicus*. The rest of this first branch passes over the Globe of the Eye, gives some twigs to the *Glandula Lacrymalis*, and goes out at the hole of the *Os Frontis* above the Circumference of the Orbit, where it is distributed in the Skin and Frontal Muscles. The second branch of the *Ramus Ophthalmicus* goes under the Muscle *Superbus*, and passes out at the hole called *Orbiter Internus*, and is distributed in the Internal Nose.

The second branch of the fifth Pair which passes out at the third hole of the *Os Sphenoides*, divides into three branches, of which one pierces the hind side of the *Os Maxillare*, and gives twigs to the Teeth of the Upper Jaw; all the rest of it comes out at the hole in the fore side of the same Bone under

the Orbit, and is distributed in the Cheeks and Nose. Another passes under the *Processus Zygomaticus*, and is distributed in the temporal Muscle, and the third is distributed in the Palate and Muscles of the *Pharynx*.

The third branch of the fifth Pair passes thorow another hole of the *Ossis Sphenoides*, and then it divides into two branches, the first of which is again divided into four branches, of which the first passes between the Condile and the *Corone* of the lower Jaw to the *Masseter*. The second is distributed in the *Crotaphites*. The third passes under the *Processus Zygomaticus* to the *Buccinator*, Glands of the Cheeks and upper Lip. And the fourth passes from behind the Condile of the lower Jaw, where it joins the *Pars Dura* over the Jaw, and is distributed in the Face. The second branch is divided into three others. The first passes between the *Pterigoidæus Externus* and the *Internus*; and towards the Angle of the lower Jaw, it sends out a branch which makes the *Chorda Tympani*, which goes also to the Muscles of the *Malleolus*, and then it joins the *Portio Dura* before it comes out of the *Cranium*, the rest is spread on the Chin. The second goes along the sides of the Tongue, sends out several branches which join

O 2

the

the ninth Pair. It gives also some twigs to the *Glandula Sublinguales*, to the Muscles of the Tongue and *Os Hyoides*. The third goes to the teeth of the lower Jaw by the holes in its inside.

The sixth Pair.

The sixth Pair of Nerves rise from the sides of the *Processus Annularis*. This is a small Nerve which passes straight thorow the *Foramen Lacerum*, and is wholly spent on the *Musculus Abducens*. But a little before it enters the Orbit, it casts back a branch which alone makes the root of the Intercoastal Nerve. It passes out of the Skull by the same passage the Carotidale Artery enters. As soon as it is come out of the Skull, it with a branch of the tenth Pair, and of the first and second of the *Vertebra* of the Neck, forms a large *Plexus* called *Cervicalis*. Below this, it receives a branch made of a twig of the tenth Pair, and of the first of the Neck. As it descends above the *Musculus Scalenus*, and below the eighth Pair, it receives a branch from each of the Vertebral Nerves. When it comes to the *Clavicula*, it divides into two branches, of which one passes above the Axillary Artery and the other under it, and then they immediately join again; they, with a branch of the first Pair of the Back, form a pretty large

Plexus

Plexus at this place; and sometimes before (for it observes no regularity) it casts out a branch, which, with a branch of the eighth Pair, forms the *Plexus Cardiacus*; then it goes down the Cavity of the *Thorax*, under the *Pleura*, near the *Vertebræ*, and as it passes by, it receives a branch from every Pair of the Back, by which it grows bigger and bigger. As it goes out of the *Thorax* it divides into several branches, of which the three Superior in the right side form the *Plexus Hepaticus*, and in the left the *Plexus Splenicus*. These *Plexus's* furnish Nerves to the Kidneys, to the Pancreas, to the Caul, to the lower Part of the Stomach, to the Spleen, to the Liver, to the Mesentery, to the Intestines; and their branches form a large Net upon the Mesenterick Arteries, called *Plexus Mesentericus*. The Inferior branches as they go down upon the *Vertebræ* of the Loins, receive a branch from the first of the Loins, and they send out some branches which join those of the Superior branches which go to the Guts, and which form the Net upon the Mesenterick Arteries. Then they go down into the Basen, and form a large *Plexus* above the straight Gut, to which it gives Nerves, as also to the Bladder, *Vesiculæ Seminales Prostratæ* in Men, and to the Womb and *Vagina* in Women. O 3 The

Nervus Auditorius.

The seventh Pair is the *Nervus Auditorius*; it arises from the hindpart off the *Processus Annularis*; it enters the hole in the inner Process of the *Os Petrosum*; it divides into two branches; that which is soft is called *Portio Mollis*; and it is distributed in the Labyrinth *Cochlea*, and Membranes which cover the Cavities of the Ear. That which is hard, is called *Portio Dura*; it goes out of the Ear by that hole which is between the *Processus Mastoideus* and *Styloides*; it divides into two branches, of which one goes to the Muscles of the Tongue, or *Os Hyoides*, and it gives a small branch to the eighth Pair. The other is distributed in the External Ear, Nose, Lips, and Cheeks.

Par Vagum.

The eighth Pair is the *Par Vagum*; it rises from the sides of the *Medulla Oblongata*, behind the *Processus Annularis*, by several Threads which join together, and go out by the same hole that the *Sinus Laterales* discharge themselves into the *Jugulares*. It is joined by a branch of the *Nervus Spinalis*, or *Accessorius Willisii*, and by a small branch of the *Portio Dura*; immediately after it comes out of the Skull, it gives a small branch to the *Larynx*, as it goes down the Neck above the Intercostal Nerve, by the side of the Internal Carotide. At the

Axillary

Axillary Artery it casts back the recurrent Nerves, of which the right embraces the Axillary Artery, and the left the *Aorta*. These two branches ascend on each side of the *Trachea Arteria* to the *Larynx*, where they are spent on the Muscles of the *Larynx* and Membranes of the *Trachea*.

Then the eighth Pair after it has entered the Cavity of the *Thorax* sends out two branches, which, with the branches of the two Intercostals, form a little above the Heart, between the *Aorta* and the *Trachea*, the *Plexus Cardiacus*, which gives a great number of small branches to the *Pericardium* and *Heart*; particularly very many creep along the *Aorta* to the left Ventricle. The eighth Pair gives also several branches to the Lungs, which accompanying the *Bronchie*, then it descends upon the *Oesophagus*, and is spread upon the Stomach, and some twigs go to the Concave side of the Liver, as has been said already.

With this Nerve it is usual to describe another which passes out of the Skull at the same hole with it. It is called *Nervus accessorius Willisii*; it arises from the *Medulla Spinalis* about the beginning of the sixth Pair of the Neck; as it ascends to the Head, it receives on each side a twig from the

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first five Pair of Nerves of the Neck, as they rise from the *Medulla Spinalis*; then it enters the Skull, and passes out of it again with the eighth Pair, and is wholly spent upon the *Musculus Trapezinus*.

The ninth Pair.

The ninth Pair rises from the *Processus Olivares* of the *Medulla Oblongata*; it passes out of the Skull by its own proper hole in the *Os Occipitis*; as it passes to the Tongue, it gives some branches to the Muscles of the *Os Hyoides*, but its Trunk is distributed in the body of the Tongue, and its Extremities form the *Papillæ Rotundæ* of the Tongue.

The tenth Pair.

The tenth Pair rises by several small threads from the beginning of the *Medulla Spinalis*, then ascending a little, it goes out at the same hole of the *Dura Mater* at which the Vertebral Artery enters, passing between the Protuberance of the *Occiput* and the first *Vertebra*, in the *Sinus* which we have observed in this *Vertebra*: Then it gives a branch to the first Pair of the Neck which goes to the *Plexus Cervicalis*; it gives another to the second Pair, and a third to the Intercoastal Nerve, and then it is all spent on the oblique Muscles of the Head.

SECT.

S E C T. III.

Of the Nerves which come out between
the Vertebrae.

THE Nerves which come out between the *Vertebrae* are thirty Pair, they arise from the *Spinalis Medulla*, which (as we have said before) is a continuation of the *Substantia Medullaris* or *Medulla Oblongata* of the Brain, contained in the great holes of the *Vertebrae*. Its Internal Substance is mixed in several places, with a Substance like the cortical Substance of the Brain, as *Malpighius* has observed. From the first *Vertebra* of the Neck to the first of the Loins, it is divided by the *Pia Mater* into the right and left side, not quite thorow its middle, but the depth of a line or two in its fore and hind Part. From the first of the Loins to its Extremity, it is divided into a great number of Fibres which separate from one another, if they be shaken in warm Water; this Part, because of its resemblance, is called *Cauda Equina*. 'Tis covered by four Membranes, of which the first is that which lines the great holes of the *Vertebrae*. The second is the *Dura Mater*, which has two *Sinus's*, one on each side of the *Medulla*; they reach from the *Occiput* to the last

of the *Os Sacrum*. The third is the *Pia Mater*; and the fourth, called *Arachnoides*, is a very fine Membrane, which contains only the bundles of Fibres which make the Vertebral Nerves.

All the Nerves, as they rise out of the *Medulla Spinalis* are by the *Pia Mater*, divided into two Plans, which lie one above the other. And as soon as the Nerves are come out of the *Vertebra*, they send a branch to one another, where they make a little *Ganglio*.

The Nerves of the *Vertebra* are thirty Pair, seven of the Neck, twelve of the Back, five of the Loins, and six of the *Os Sacrum*; they come out at the holes in the sides of the Bodies of the *Vertebra*, which have been taken notice of in the *Osteology*.

Of the Nerves
of the Neck,

The first Pair of the Neck is spread in the Muscles of the Head and Neck; it joins a branch of the tenth Pair, which goes to the *Plexus Cervicalis*, and it gives another branch to the Intercostal Pair below the *Plexus*.

The second Pair of the Neck gives also Nerves to the Muscles of the Head and Neck, to the External Ear and Skin of the Face.

The third gives some branches to the Neck and Head; it sends out the *Nervus Diaphragmaticus*, being joined by a branch from the fourth Pair. This
Nerve

Nerve goes straight down the Cavity of the *Thorax*, and is spread on the Midriff.

The fourth, fifth, sixth and seventh, gives some branches to the Muscles of the Neck and Head, but their greatest branches, together with a branch of the first of the Back, enter the Arms. As soon as they enter they join all together, and then they immediately divide into five branches. The first and innermost goes all to the Skin which covers the inner and fore part of the Arm. The second goes down by the inner Protuberance of the *Humerus*, by the benders of the Fingers; and in the Palm of the Hand it divides into five branches, of which one goes to each side of the little and the ring Finger, and the fifth to the External side of the middle Finger. The third accompanies the Artery between the *Sublimis* and the *Profundus*, and divides also into five branches, of which one goes to each side of the Thumb and fore Finger, and the fifth to the Internal side of the middle Finger. The fourth passes under the *Biceps* to the outer side of the Arm and Back of the Hand, to be distributed into the Fingers as the foregoing. The fifth is spent on the Muscles on the inside of the Arm. All these Nerves, except the first, give

give branches to the Muscles as they pass by.

Of the Nerves
of the Back.

The first Pair of the twelve Pair of the Back gives a branch (as is said) to the Arms. The twelfth Pair is dispersed in the Muscles of the lower Belly, and all the rest run along the *Sinus* in the under side of each Rib, giving Nerves to all the Muscles that lie upon the Ribs and *Vertebrae*.

Of the Nerves
of the Loins.

The first and second Pair of the Loins give Nerves to the Muscles of the lower Belly, to the *Inguen*, to the Yard, and to the Parts contained in the Basin. The third and fourth give some branches to these same Parts, but their Trunks join and make the *Nervus Anterior Femoris*, which is dispersed in the forepart of the Thigh. This Nerve sends a branch thorow the hole in the *Ischium*, which is spent in the *Triceps*. The last of the Loins with a branch of the fourth, enter the Thigh.

Of the Nerves
of the Os Sacrum.

The Nerves of the *Os Sacrum* come not out at the holes on its backside, but at those in its foreside; and the last comes out between the Extremity of the *Sacrum* and the *Os Coccygis*.

The first four Pair of the *Os Sacrum* give some twigs to the Parts in the Basin, but their great branches, with the last, and a branch of the fourth of the Loins, make the *Nervus Sciaticus*.

cus, which is the greatest Nerve in the whole Body. As this Nerve passes between the *Gracilis Posterior* and the *Semimembranosus* it gives a branch to the Skin. When it comes to the Ham it divides in two, of which one goes along the *Perone* to the upper Part of the Foot, and gives a branch to both sides of each Toe. The other passes under the *Gemelli* by the inner Ankle, and is distributed in like manner to the Toes in their under sides.

The fifth and sixth of the *Os Sacrum*, are very small, they are dispersed in the Sphincter, and Bladder, and Natural Parts.

S E C T. IV.

Of the Veins in General.

THE Ancients thought that the Veins had only one Coat; but *Willis* hath remarked, that the *Vena Cava* and the *Vena Pulmonaria* have four different Coats, which apparently they have thorow all their Ramifications.

The first of these Coats is woven of nervous Fibres disposed length-ways, but not altogether in a straight Line. This Coat is loose and stretches very easily, 'tis not closely tied to the rest.

The

The second is a Web of small Vessels in form of a Net, it furnishes the necessary Nourishment to the rest of the Coats.

The third is made of little Glands, which separate the serosity of the Blood brought by the Vessels of the second Coat.

The fourth is composed of Muscular and Spiral Fibres, whose Parts successively contracting, hasten the Circulation of the Blood.

The only reason why the Veins do not beat as the Arteries do, is because the Blood in the Veins runs from a narrow Channel into a broader; whereas in the Arteries it runs from a wide Vessel to a narrower one.

Authors do not agree about the Origination of the Veins. Some say that it is in the Heart, and some others will have them to rise out of the Liver. Others think that they come from all the Parts of the Body, by their little branches which are distributed thorow it, where they say they have their beginning, as so many roots which join to make a Trunk, or as little Brooks that produce a River. But they have juster thoughts who think that they have no Origination at all, no more than all the other Parts of the Body, which are all formed in the *Cicatricula* of

of the Egg, where they only grow and are insensibly disclosed.

The branches of the Veins in proportion as they recede from their Trunks, they divide into an infinity of little Capillary branches, which at last are imperceptible. These Capillary branches are spread thorow all the *Viscera*, in the Membranes, and thorow all the Fibres of the Muscles, to receive the Blood which was brought there by the Arteries. The Extremities of the Veins unite to all the Extremities of the Arteries: But because there are more Capillary Veins than Arteries, the Veins unite with one another, and so likewise do the Arteries, that if one Branch be stopt, the Blood may have a Passage by another. These Unions Authors call *Anastomosis*.

The Veins have in their Cavities little Membranes or Valves, disposed at certain distances in such a manner that they open towards the Heart, and they shut towards the Extremities of the Body to hinder the Blood to return, and to sustain it, that by its weight it fall not back again. There are more Valves in the Veins of the Thighs, Legs, Feet, and of the Arms and Hands, than in the other Parts of the Body. There are none in the *Vena Porta*, the Emulgent Veins, nor in the *Vena Pulmonaria*.

monaria. The openings of the Valves are disposed alternatively, to the end that the Blood which escapes or falls back from one may be stopt by the next. Their Figure is almost like a Half-Moon; their Substance is membranous, fine and strong; their number is uncertain.

The use of the Veins is to bring the Blood back again to the Heart from all the Parts of the Body.

S E C T. V.

Of the Vena Porta.

ALL the Veins rise from two principal Trunks, *viz.* The *Porta* and the *Cava*, except that of the Lungs which is a particular Vein, and separate from the rest.

The *Vena Porta* was so called by the Ancients, because they thought that it brought the Chyle by its Meseraick branches from the Intestines to the Liver, thorow whose Substance 'tis spread, as is said in the Section of the Liver. It rises out of the Liver; it sends out two small Veins to the *Vesica Fellis* called *Cystica Gemella*, one to the Stomach called *Gastrica Dextra*, then advancing a little to the left, its trunk divides into two branches, of which
the

the least called *Ramus Splenicus*, goes to the left *Hypochondrium* : And the greatest called *Mesenterica* goes to the right. The *Ramus Splenicus* so called, because it carries the Blood from the Spleen, sends out from its Trunk two branches called *Gastrica Minor & Major*, which are spread thorow all the Stomach. A branch of the *Gastrica Major* makes the *Coronaria Stomachica* at the upper Orifice of the Stomach. It gives three branches more, two to the *Omentum* and *Colon*, and the third to the *Pancreas*.

Then the *Splenicus* divides into two branches ; the one Superior, the other Inferior.

The Superior sends out the *Vas Breve*, and some other branches which go to the Spleen.

The Inferior gives two branches, *viz.* The *Epiplois Sinistra*, which is spread thorow the back Part of the *Omentum*, and that Part of the *Colon* which is under the Stomach. The other branch is the *Gastro-Epiplois Sinistra*, which is also spread upon the *Omentum* and upon the Stomach ; it makes sometimes the *Vena Hemorrhoidalis Interna*. The rest of this Inferior branch enters the Substance of the Spleen.

The right branch of the *Porta* called *Vena Mesenterica*, before it divides, sends
out

out the *Gastro-Epiplois Dextra*, which is spread in the *Omentum* and lower Part of the Stomach; it sends out also to the *Intestinalis*, which goes to the *Duodenum*, and to the *Jejunum*; it gives some branches to the *Omentum* and *Pancreas*.

Then the *Mesenterica* divides into three great branches, which run betwixt the Duplicature of the *Mesenterium*, two of them go towards the right side which divide into fourteen branches, and these are again divided into an infinity of others less which are called *Meseraica*; they creep upon the *Jejunum*, *Ilium*, *Cacum*, and Part of the *Colon*.

The last and third branch of the *Vena Mesenterica*, is spread thorow the middle of the *Mesenterium*, to that Part of the *Colon* which is on the left side, to the *Rectum*, down to the *Anus*, where it forms the *Hæmorrhoidales Internæ*.

The Use of this Vein is to bring back to the Liver the Blood which was brought by the Arteries to these several Parts.

S E C T. VI.

Of the Trunk of the Cava Ascendens.

ALL the little Capillary branches of the *Vena Cava*, which are spread thorow the Substance of the Liver, unite by little and little into others, which grow bigger; and as they approach the Convex side of the Liver, where they join all together and make up one large Trunk which comes out of the Liver and divides into two great big branches, one of which goes towards the Heart, and forms the Trunk called *Ascendens*; the other goes downwards, and is called *Descendens*. Both the one and the other lie upon the Body of the *Vertebrae*, on the right side of the *Porta*.

The *Vena Cava Ascendens* goes to the *Claviculae* before it divides, but as it ascends to them, it casts out three branches on each side. The *Phrenica* or *Diaphragmatica*, the *Coronaria*, and the *Intercostalis Superior*. Besides these three, it sends out the *ἀζυγος*, or *Vena sine Pari* on the right side only.

The *Phrenica* comes from the *Cava*, where it pierces the *Diaphragma* upon which it is spread. It casts some branches to the *Pericardium* and *Mediastinum*. Some Authors think, that 'tis by

by this Vein that the *Pus* of an *Empiema*, is carried to the Kidneys and Bladder.

Before the *Cava* enters the Heart, it gives the *Coronaria*. There are sometimes two Veins of that Name; they surround the basis of the Heart.

The same Trunk as it comes out off the Heart pierces again the *Pericardium*, and passes between the two Lobes of the Lungs, sends out the *αζυγες*, or *Sine Pari* from its right and backside, about the fourth and fifth *Vertebra* of the Back, it descends the Cavity of the Breast a little towards the right, till about the eighth or ninth *Vertebra*, where it casts out branches on each side of its Trunk called *Intercostales*, because they run along the eight last Ribs, and they join by *Anastemosis* with the branches of the *Thoracica Inferior*, and with the Intercostal Arteries. Then it divides into two branches; the one goes to the right, the other to the left, and they both open into the *Cava* above, and sometimes into the *Emulgents*, by which Communication some explain the way, tho' contrary to the Laws of the Circulation of the Blood, how the matter of an *Empiema* is evacuated by Urine. This Vein gives some little branches to the *Medulla Spinalis*.

The

The *Intercostalis Superior*, which comes from the *Cava Ascendens*, is distributed in the Interstices of the four first Ribs, to which the *Azygos* comes not. Remark that the branches both of the one and the other run in the *Sinus's* which are on the lower sides of the Ribs.

Sanmichellius hath observed, that the Trunk of the *Cava Ascendens* gives a branch called *Pneumonica*; 'tis this branch which accompanies the *Arteria Bronchialis* of *M. Ruysch*.

S E C T. VII.

Of the Venæ Subclaviæ, Jugulares, and their Branches.

THE Trunk of the *Cava Ascendens*, as soon as it comes to the *Clavicula*, where it is sustained by the *Thymus*, is divided into two branches, the one goes to the right, the other to the left; they are called *Subclaviæ*, which send out several other branches.

The first is the *Mammaria*, which comes sometimes from the *Cava*, before it divides into the *Subclaviæ*, this Vein is distributed in the Dugs, and frequently it goes lower, and makes an *Anastomosis* with some branches of the *Epigastrica*.

The

The second is the *Mediastina*, which is ordinarily one coming from the trunk of the *Cava*, it goes to the *Mediastinum* and *Thymus*.

The third is the *Cervicalis* or *Vertebralis*, which goes up the *Vertebra* of the Neck, and casts some branches by the by to the *Medulla Spinalis*.

The Fourth is the *Muscula Inferior*, which comes sometimes from the *Jugulars*, 'tis distributed thorow the *Inferior Muscles* of the Neck, and the *Superior* of the Breast. The branch that answers this, is called *Muscula Posterior*, because 'tis distributed in the *Muscles* which are in the hind Part of the Neck.

After that the *Rami Subclavii* are come out of the Cavity of the Breast, they are called *Axillares*, they send out the *Scapularis Internus* and *Externus* which go to the *Muscles* of the *Scapula*, and to the *Glands* in the *Armpits*: Then they are divided into two branches; the *Superior* is called *Cephalica*, and the *Inferior Basilica*.

From the *Basilica* rises the *Thoracica Superior*, which goes to the *Dugs* and *Muscles* of the Breast. The *Thoracica Inferior*, which spreads it self upon the side of the Breast, by several branches which communicate by *Anastomosis*, with the branches of the *Azygos*, under the *Muscles* of the Breast. The

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The *Subclavii* send out also the *Jugulares externi* & *interni*, which go to the Head.

The *Jugulares externi* ascend towards the Ears, where they divide in two branches, the one Internal, the other External. The Internal goes to the Muscles of the Mouth and of the *Os Hyoides*. The External lying upon the *Parotides*, divide into two branches, of which one is spread thorow all the Face, and the branches of the one side unites with those on the other side, and form the *Vena Frontis*, which they open sometimes in Diseases of the Head: The other branch goes to the Temples and hind Head.

The *Jugulares interni* ascend to the Basis of the *Cranium*, where they are divided into two branches, of which the greatest open into the *Sinus Latc- rales* of the *Dura Mater*, by the holes thorow which the eighth Pair of Nerves come out; the least goes to the *Pia Mater*, by the hole which is nigh the *Cella Turcica*.

SECT. VIII.

Of the Veins of the Arms and Hands.

THE *Basilica* and *Cephalica*, are the two principal Veins of the Arms and Hands.

The

The *Cephalica* creeps along the Arm, between the Skin and the Muscles; it divides into two branches.

The External branch goes down to the Wrist, where it joins the *Basilica*, and turns up to the Back of the Hand, where it gives a branch which makes the *Salvitella*, between the ring Finger and the little Finger. The ancients used to open this Vein in Diseases of the Head, in continued and intermitting Fevers; but the Moderns approve not of this particular Practice; since the Knowledge of the Circulation of the Blood, there is no difference whether one be bled in the *Cephalica*, *Mediana*, or *Basilica*.

The Internal branch of the *Cephalica*, together with a branch of the *Basilica*, makes the *Mediana*.

The *Basilica*, which is the Inferior branch of the *Axillaris*, divides into three branches under the Tendon of the *Musculus Pectoralis*.

The first branch accompanies the fourth branch of Nerves that goes to the Arm.

The second is called *Profundus*; it reaches below the Elbow, where it divides into two branches; The one External, which goes to the Thumb, the Fore-finger, and to the *Musculi Extensores Carpi*; The other Internal, which goes

goes to the middle Finger, to the ring Finger, to the little Finger, and to the inner Muscles of the Hand.

The third branch is called *Subcutaneus*, towards the inner Condyle of the Arm, it divides into the *Ramus Anterior* and *Posterior*. The first goes under the Muscles of the *Ulna* to the little Finger, where it joins a branch of the *Cephalica*; the second near to the Elbow, sends out a branch which goes to the Wrist, then it unites with the *Cephalica Interior*, and forms the *Mediana*.

The *Mediana*, which is made of the *Cephalica Interior*, and the second branch of the *Ramus Subcutaneus* of the *Basilica*, divides into two branches upon the *Radius*, the one External called *Cephalica Pollicis*, which runs between the Thumb and the fore Finger. The other Internal, which goes between the ring Finger and the middle Finger, and sometimes between this last and the fore Finger.

S E C T. IX.

Of the Trunk of the Cava Descendens.

THE Trunk of the *Cava Descendens* accompanies the great Artery from the Liver to the fourth *Vertebra* of the Loins, where it divides into two great
P bran-

branches called *Iliaci*, but before this Division, it casts forth four branches from each side.

The first is the *Vena Adiposa* or *Renalis*, which is spread on the Coat and Fat that covers the Reins.

The second is the *Vena Emulgens*, which goes to the Kidney, where it divides into several more branches.

The third is the *Vena Spermatica*, of which we have already spoken.

The fourth is the *Vena Lumbaris*, which is not always one, but often two or three on each side, which they divide into Superior and Inferior they are bestowed on the Muscles of the Loins and on the *Peritoneum*. They sometimes call the last branch of these *Lumbaris*, *Muscula Superior*.

There are some Anatomists that have observed, that there is a branch of the *Lumbaris* that enters the Cavity of the *Vertebra*, and which ascends to the Brain, which gave them occasion to think against all probability that the seed descended by that Vein from the Brain.

A little below the Emulgents the great Artery goes above the *Cava*, and then the *Cava* divides into two branches called *Iliaci*, because they pass above the *Ilia* to go to the Thighs. Near this Division they send out one or two branches called *Vene Sacra*; the

go to the *Medulla* of the *Os Sacrum*.

Then the *Vena Iliaca* divide into two branches, the one Internal, the other External. The Internal sends out two branches, the *Muscula Media* which is spread thorow the Muscles of the Thigh, the *Hypogastrica*, which is sometimes double, it's spread about the *Sphincter* of the *Anus*; wherefore 'tis called their *Hemorrhoidalis Externa*. The *Hypogastrica* is spread also upon the Body of the Bladder, upon the *Matrix* and its Neck, therefore some thought without ground that the Menstrual Blood was discharged by this Vein which comes only from the Arteries.

The External branch of the *Iliaca* sends out three branches, two before it goes out of the *Peritoneum*, and the third after it goes out of it.

The first is the *Vena Epigastrica*, which comes rarely from the *Cruralis*, it goes to the *Peritoneum*, ascends to the *Musculi Recti*, where it Rencontres the *Mammaria*, with which it communicates by *Anastomosis*.

The second is the *Vena Pudenda*, 'tis spread upon the Parts of Generation.

The third is the *Muscula Inferior*, it goes towards the Articulation of the *Femur*, and is distributed to the Muscles of this Part.

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The *Iliaca Exterior*, after it hath sent out all these branches, takes the name *Cruralis*, and then sends out six branches more.

The first is the *Vena Saphena*, which goes down under the Skin along the inside of the Thigh and Leg, accompanied with a Nerve which loses it self at the inner Ankle. The *Saphena* turns towards the upper Part of the Foot, where it gives several branches, of which some go to the great Toe.

The second is the *Ischias Minor*, this Vein is little; 'tis spent on the Muscles and Skin which are about the upper Joint of the *Femur*.

The third is the *Muscula Externa*, because it goes to the External Muscles of the Thigh, on the other side of the *Cruralis*, just opposite to the beginning of this Vein, there goes out another called *Muscula Interna*, which goes to the Internal Muscles of the Thigh.

The fourth is the *Poplitea* made of two different branches united together; it goes straight down by the Ham to the Heel; it lies pretty deep, upon which account it can hardly be opened. The branches which appear in this place are not of this Vein.

The fifth is the *Suralis*, which is pretty big, and which divides into
two

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two branches, the one External which is least, the other Internal which is biggest. Each of these branches divide again into two more; the one External, the other Internal.

The *Suralis* distributes its branches upon the fat of the Leg, and makes with the branches of the *Poplitea*, all those *Plexus* of Veins which are conspicuous, on the upper Part of the Foot.

The sixth and last branch of the *Cruralis* is the *Ischias major*, which goes also to the Muscles and fat of the Leg, and is divided afterwards into several branches, which are distributed to the Toes.

S E C T. X.

Of the Lymphatick Vessels.

I Have referred the Lymphatick Vessels till now, because they do not properly belong to any particular Part of the Body. They are small and Pellucide Canals, which carry a thin and clear Liquor from all the Parts of the Body towards the Heart. They have a fine transparent Coat; their Cavity is full of Valves, which open towards the Heart, and which shut towards the Extremities. Of these Lymphatick Vessels, some rise from the *Viscera*, as the Liver, Spleen, Lungs, &c. and others

P 3 from

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from the Glands, which are spread thorough all the Parts of the Body.

They have no common Trunk nor Receptacle, but they discharge themselves into different Vessels, as they are nearest to them, *viz.* the Receptacle of the Chyle, the *Ductus Thoracicus*, and the Subclavian, Axillary, Jugular, and other great Veins.

The Lympha which the Vessels contain comes from the Serosity of the Blood which is separate in the Glands. Some Authors think, that it comes also from the *Succus Nervosus*, which is brought by the Nerves to the Glands; it's ordinarily clear and transparent, but it changes its colour according as 'tis tinged by the Chyle, Bile, Blood, and other Humours. 'Tis insipid of it self, but sometimes 'tis acid, salt, or bitter. It coagulates sometimes by the mixture of Liquors and dissolution of Salts, as the Serosity of the Blood, and when it's dried, it has a particular Smell.

If you examine it Chymically, you may draw from it much volatile but no fixt Salt, some Phlegm, and Sulphur, and a little Earth. Acids coagulate it, and Volatile Spirits dissolve it.

The Lympha serves to liquifie the Chyle and Blood, that thereby they may the more easily move. Some think it

it serves to nourish and augment the Body : But if we consider its Nature, and the Parts it discharges it self into, 'tis more probable, that 'tis a proper *Menstruum* for the last and finest dissolution of the Chyle. It hinders the dissipation of the Spirits ; it helps to make Fermentations ; it temperates the Acrimony of the Bile and Acids ; it dissolves Salts.

The breaking of the Lymphatick Vessels, is often the cause of Dropsies.

S E C T. XI.

Of the Arteries in General.

W*illis* hath demonstrated that the Arteries have four Coats, as well as the Veins.

The first is thin and nervous ; its inner is woven of little Veins, Arteries, and Nerves, whose Extremities terminate in the other Coats.

The second Coat adheres to the first ; in it there are an infinite number of little white Glands.

The third is musculous, made of many Spiral Fibres, which are close to one another.

The fourth and last is a Coat, whose Fibres are in a straight Line.

The Blood which is necessary for the nourishment of these Coats, is

brought to them by the little Arteries,, and that which remains, is brought back by the Veins ; the Serosity is separated by the Glands, and the Animal Spirits are brought by the Nerves to the muscular Fibres of the Coats, for the assisting the Pulse of the Arteries.

The beating of the Arteries, as well as that of the Heart, is nothing else,, but what we call *Systole* and *Diastole*. It is done, as much by the Structures of the Fibres of the Heart and Arteries, as by the Blood, which being thrust with Violence by the Contraction of the Fibres of the Heart into the *Aorta*, dilates its Fibres, because it is thrust from a wide passage into a narrow one, the Fibres being once dilated, by their spring contract again, and so thrust the Blood to their Extremities, as fast as they receive it from the Heart.

The Use of the Arteries is to carry the Blood to all the Parts of the Body. It is hard to distinguish the Capillary branches of the Arteries from those of the Veins, if it is not by the Injection of tinctured Liquors.

The Capillary branches throughout all the Body, unite with one another as well as with the Veins.

S E C T. XII.

Of the Trunk of the Aorta Ascendens.

THE *Aorta* coming from the left Ventricle of the Heart sends out two branches called *Coronariae*, before it pierces the *Pericardium*, but after it hath pierced it, it ascends a little, and then it crooks downwards and forms the *Aorta Descendens*. From the upper side of this Crook it sends out three branches, two on the left side, which are one Subclavian, and one Carotide, one on the right side which is the right Subclavian, from which immediately rises the right Carotide.

The *Arteria Subclavia* on each side send out the *Mediastina*, the *Intercostalis Superior*; the *Mammaria*, the *Cervicalis* or *Vertebralis*, and the *Muscula* which goes to the Muscles of the Neck, of the Breast, and to the *Glandula Thyroides*. After that the *Subclavia* hath passed thorow the *Musculus Scalenus*, it is called *Axillaris*.

The *Arteriae Carotides*, as they ascend on each side of the *Trachea Arteria*, give some small branches to the *Trachea Arteria*, to the *Larynx*, to the *Glandula Thyroides*, and then they divide into two branches, the one Internal, the other External.

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The External Carotide sends out four branches.

The first goes to the Tongue, to the Muscles of the *Os Hyoides*, and to the *Pharynx*.

The second divides into two branches, of which the first loses it self in the Muscles *Milohyoides* and *Digastrici*; and the second goes along the basis of the lower Jaw, and is lost in the Muscles of the Lips.

The third branch of the External Carotide divides at the Angle of the lower Jaw into two branches; one enters into the lower Jaw, and the other makes the *Arteria Temporalis*.

The fourth branch of the External Carotide goes to the Muscles on the hind Part of the Neck, and to the Skin of the hind Head.

The Internal Carotide passes thorow the Canal in the *Os Petrosum*, gives some branches to the *Dura Mater*, joins with the *Cervicalis*, sends out branches to the *Glandula Pituitaria*, *Plexus Chorooides*, then it runs thorow all the Circumvolutions of the *Cerebrum* and *Cerebellum*, and loses its Capillary branches in their Cortical Substance.

The *Axillaris*, having pierced the *Scalenum*, gives some little branches to the nearest Muscles; it sends out the *Thoracica Superior* and *Inferior*, the *Scapularis*,

pularis, and then it gives a branch, which passes under the Head of the *Humerus* into the *Musculus Longus* and *Brevis* of the Arm.

The Trunk of the *Axillaris* goes down the inside of the Arm, giving branches by the way to the Muscles that lie upon the *Humerus*. Above the Elbow it sends out a branch, which is spread upon the Internal Condyle of the *Humerus*.

At the bending of the Elbow this same Trunk divides into two branches, the one External, and the other Internal.

The External runs along the *Radius*, it casts out a branch which goes to the *Supinator*, and ascends to the *Brachialis Internus*, in the rest of its course down to the Wrist, it gives branches to the *Longus*, *Rotundus*, and benders of the Fingers, Wrist, and Thumb. Being come to the Wrist it sends out a branch, which goes to the beginning of the *Tenar*, then it passes under the Tendon of the *Flexor Pollicis*; it gives branches to the External Part of the Hand, and it passes under the Muscles between the fore Finger and the Thumb, to which it gives a branch on each side.

The Internal branch goes down along the *Cubitus* to the Wrist, and is distributed to the middle Finger,
to

to the ring Finger, and to the little Finger.

S E C T. XIII.

Of the Aorta Descendens.

THE *Aorta Descendens* sends out first the *Bronchialis* of *M. Ruysch*, which accompanies all the branches of the *Bronchia*. A little lower it gives the *Intercostalis Inferior*, the *Phrenica* which are distributed in the *Diaphragma*, the *Lumbaria* which goes to the Muscles of the Loins and *Psoas*, the *Celiaca* which divides into two branches, the one on the right, the other on the left, of which the first gives the *Gastrica Dextra*, which goes to the Stomach, the *Cistica* to the Gall-Bladder, the *Epiplois Dextra* to the *Omentum*, the *Intestinalis* to the Intestine *Duodenum*, and to a Part of the *Jejunum*, the *Gastro-Epiplois* to the Stomach, to the *Omentum*, and some branches to the Liver, which enter the *Capsula Communis*, to accompany the branches of the *Vena Porta*.

The left branch of the *Celiaca* gives the *Gastrica Dextra*, which is also spread on the Stomach, the *Epiplois Sinistra* to the *Omentum*, and the *Splenica* to the Substance of the Spleen.

Then the *Aorta Descendens* sends out the *Mesenterica Superior*, the *Renales* or *Adiposæ*, which go to the *Glandule Renales*.

nales, and fat about the Reins, the Emulgentes to the Reins; the *Spermatice* to the Testicles, the *Lumbares Inferiores* to the Muscles of the Loins, the *Mesenterica Inferior*, which with the Superior is distributed thorow all the *Mesenterium*, and which accompanies all the branches of the *Vena Meseraica*. When the *Aorta* is come to the *Os Sacrum*, it divides into two branches called *Iliacæ*, and before these branches go out of the Cavity of the lower Belly to go to the Thighs, it sends out 4 or 5 branches.

The first is the *Sacra*, which rises near the middle of the division, and is spread in the lower Belly upon the *Os Sacrum*.

The second and the greatest is the *Hypogastrica*, 'tis distributed to the Bladder, to the *Rectum*, to the outer and inner side of the *Matrix*, and to the *Os Sacrum*; then it gives two considerable branches which go out of the lower Belly. The first passes under the *Pyrisformis*, and is distributed to the Muscles called *Glutei*. The second which is lower than the first gives also two branches pretty big, of which the first goes to the *Obturatores*, the second pierces the Cavity of the *Abdomen*, under the *Pyrisformis*, and loses it self by several branches in the *Glutæus Major*.

The third is the *Pudenda*, which passes under the *Os Pubis*, goes to the Privities;

ties; when this branch is wanting the *Hypogastrica* supplies its place.

The fourth is the *Ilias Minor* or *Muscula Inferior*, it goes to the Muscle *Iliacus, transversus*, and *Obliquus Ascendens*.

The fifth and last branch is the *Epi-gastrica*, which goes up under the *Musculi Recti*.

After that the Trunk of the *Iliaca* is come out of the lower Belly, it is called *Cruralis*; it sends out two or three branches, which lose themselves in the Skin and Muscles upon the upper and forepart of the Thigh.

Four or five fingers below the Groin, the *Crural* sends out three branches bigger than the first three.

The first is called *Muscula*, which gives several branches. The first passes between the Muscles called *Iliacus* and *Pectineus*, and loses it self in the third Head of the *Triceps* in the *Semimembranosus* or *Seminervosus*, in the beginning of the *Biceps*, in the *Quadrigemini*, and in the Cavity of the great *Trochanter*.

The 2d, 3d, and 4th. go to several parts of the *Triceps* & *Gracilis Posterior*.

Then the Trunk of the *Muscula* goes under the first of the *Triceps*, and divides into three branches more.

The first having pass'd the third of the *Triceps*, is lost in the *Semimembranosus*. The second passes under the *Fe-*

mur to the *Vastus Externus*. The third goes a little lower, casts branches to the Tendon of the third of the *Triceps*, it loses it self at the end of the *Seminervosus*, and at the end of the great Head of the *Biceps*.

The second considerable branch of the Trunk of the Crural goes to the External Part of the Thigh; passes under the *Sartorius*, under the *Gracilis Rectus*; it casts some branches to the end of the *Iliacus*, to the beginning of the *Gracilis Rectus*, to the *Vastus Externus*, *Cruralis*, *Membranosus*, and forepart of the *Gluteus Minor*.

The third rises almost from the same Part of the Crural, and loses it self in the middle of the *Gracilis Rectus*, *Cruralis*, and *Vastus Externus*.

The Crural having sent out these three branches, gives several branches to the *Sartorius*, to the *Gracilis Posterior*, but the greatest goes to the *Vastus Externus*.

As the Crural descends it sinks the deeper in the hind part of the Thigh, passing thorow the Tendons of the *Triceps*: being come to the Ham, the first branch it sends out is spread on the hind part of the Thigh Bone, and it goes to the little Head of the *Biceps*; then it casts out several other branches, which lose themselves in the fat, and in the Extremities of the Muscles behind the *Femur*.

mur.

mur. Under the Ham it sends out two *Poplitæ*, which go round the Knee, the one in the inside, the other in the outside. It casts out a little lower several other branches, of which some go to the beginning of the *Gemini*, of the *Soleus*, *Plantaris*, and *Popliteus*, and the rest surround the *Tibia* on all sides.

Then it divides into two branches, of which the first passes thorow the Membrane, which joins the *Tibia* and *Perone* together, upon which it continues its way, giving branches to the *Tibialis Externus*, and to the *Extensores Digitorum*.

The second branch divides into two more, the one External, the other Internal.

The External after it hath given branches to the *Soleus*, to the *Peroneus Posterior*, and to the *Flexor Pollicis*, pierces the Membrane between the *Tibia* and *Perone*; rises upon the External Ankle, to spread it self upon the upper part of the Foot.

The Internal as it descends gives branches to the *Soleus*, to the *Flexores Digitorum*, to the *Tibialis Posterior*, then it passes by the Cavity of the *Perone*, where it divides into two branches, of which one passes under the *Tenar* to the great Toe, the other passes between the *Musculus Brevis* and the *Hypotenar*, and is distributed into the other three Toes.

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